

UNIVERSITY OF EDINBURGH
FACULTY OF ARTS
DEPARTMENT OF POLITICAL ECONOMY

INVESTMENT CRITERIA IN THEORY AND PRACTICE
WITH SPECIAL REFERENCE TO THE UNITED ARAB
REPUBLIC

THESIS PRESENTED FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

BY

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EDINBURGH



JUNE, 1963.

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On the problem and its setting:-

It has been said that each economy has its own economic structure and problems. To the extent that this is true, generalization on the economic structure and characteristics of developed and developing countries seeking economic growth will lead us astray.

That can be inferred from the existing literature on this subject is set out in what follows:-

(i) "Structural Disparities" and "Technological Dualism".

Preface And Acknowledgement

"The object of the exercise, one has to remember, is not perfection, but minimization of imperfection"

A.K. Sen,
Quarterly Journal of
Economics, Vol.71,
p.571.

As regards the dual structure of less developed economies, the literature has provided different terms describing the nature of the dual. For example terms such as "industrial and rural", "advanced and retarded", "capitalized and non-capitalized" have been used. Others have also distinguished the advanced sector from the

1. See for example, Anand, S., Chaudhry and P. Ghosh, *Inter-Regional Disparities* (New York, 1973), especially pages 273-307. For a survey of the literature, see Ghosh, "The Interpretation of Regional Disparities" in *The Allocation of Economic Resources*, Oxford University Press, 1979.

1. On the problem and its setting:-

It has been said that each economy has its own economic structure and problems. To the extent that this is true, generalizations on the economic structure and characteristics of less developed but developing countries seeking economic growth will lead us astray.

That can be inferred from the existing literature on this matter is distinguished in what follows:-

(i) "Structural disequilibrium" and "technological dualism".

The former term is used in the literature to denote a condition in which the existing distribution of the stock of capital and other complementary factors does not permit the best use to be made of the available labour and natural resources. Strictly speaking the term reflects an inequality between the proportions in which factors are available and the proportions in which they are used in production.⁽¹⁾

As regards the dualistic structure of less developed economies, the literature has provided different terms describing the nature of the dual. For example terms such as "industrial and rural", "advanced and retarded", "monetized and non-monetized" have been used. Experts have also distinguished the advanced sector from the

1. See, for further details, H.Chenery and P.Clark, Inter-industry Economics (New York, 1959), especially pages 278-307. See also H.Chenery, "The Interdependence of Investment Decisions" in the Allocation of Economic Resources, Stanford University Press, 1959.

retarded one in the same economy as one in which a large scale manufacturing including most of the complementary facilities connected with this industry prevail. Furthermore, the advanced sector is usually technologically developed, monetized, efficiently managed and high in productivity. It goes without saying, that the backward sector bears the adverse features, i.e. technologically retarded, low in productivity and employment opportunities.⁽¹⁾

- (ii) Imperfections in factor markets with a wide range of prices for capital, labour and foreign exchange, caused by cultural and institutional obstacles to the movement of these factors between alternative uses;
- (iii) failure to use reducing cost methods of production because of the scarcity of innovators, ignorance of technological possibilities, shortage of capital in large blocks;
- (iv) small size of the market,⁽²⁾ in particular for manufactured goods, in relation to the size of a minimum cost plant;
- (v) weak interdependence⁽³⁾ and linkages.⁽⁴⁾

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1. See B.Higgins, Economic development, principles and policies, New York, 1959. See also, United Nations recent report on "Programming Techniques for Economic Development", Bangkok, 1960, specially pp.28-29. See also, A.O.Hirschman, Investment Policies and Dualism in Under Developed Countries, American Economic Review, Vol.XLVII, 1957.
 2. This factor is emphasised by R.Nurkse in his Problems of Capital Formation in Under Developed Countries, Oxford, 1953.
 3. For lack of interdependence in less developed countries see Peacock, A.T. and Dosser, D., "Input-Output Analysis in an Under-Developed Country: A Case Study," "Review of Economic Studies (October 1957).
 4. For linkage effects see A.O.Hirschman, The Strategy of Economic Development, New Haven, 1958.

At the present, however, many of less developed countries have been formulating and implementing development plans. In establishing a complete development programme, the first thing to be done, is to clarify the various aims of economic policy. The statement of objectives may include, for instance, increasing national income, maintaining or achieving balance in international trade, reducing¹¹ employment, a stable price level, a reduction of inequalities in income distribution and so on and so forth.

The over-all development programme should also include the following features:-(1)

- (a) projections of the growth of national income, population, investment, consumption and the balance of payment;
- (b) estimation of the supply of domestic savings, foreign investment, various types of labour and other resources;
- (c) a statement of criteria for the allocation of investment funds and foreign exchange subject to government influence in view of the predetermined national objectives;
- (d) projections of the growth of various sectors of the economy and the requirements of each sector for investment funds and other resources;
- (e) a balancing of resource requirements from (d) against availabilities from (b), and a reconciliation of sector and aggregate projections.

Clearly, the above mentioned factors are all the more needed in establishing a complete development programme. In this study however, we will only focus attention on the statement of investment

1. See *ibid.*, ch. 11. *Chenery & Clark* [29]

criteria. This is because the selection of an investment project, programme or a plan involves decisions both of non-economic and economic character. Although we cannot ignore the decisive effects of the former group of decisions, in this study we will only concentrate on the economic considerations.

Among the most important decisions which have to be made when preparing a development plan are those concerning the size of the investment programme, the distribution of investment between the public and the private sector, the allocation of investment among the various sectors of the economy and within each sector, the location of industries and the technical form of investment.

In brief, given the capital available (including foreign exchange), the object of this study is to explore the degree to which economic theory can be of help to the development planner faced with the problem of investment choices.

Firstly, a theoretical study is made to cover some of the main investment rules and priority systems that have found their way into the literature of development planning. Our discussion of the subject lies into two parts. While part one of this study critically examines the Quarterly Journal of Economics investment criteria discussion, part two is devoted for the discussion of some of the priority systems thus far developed by National Planning Institutes.

Secondly, in the light of what have been discussed in the first two parts of this study, in part three we will critically examine the U.A.R. recent practice in development planning with special reference to the question of investment priorities.

2. On Acknowledgement

I would like to acknowledge my indebtedness, first of all, to my supervisors Professor Alan T.Peacock and Mr Douglas G.M.Dosser, who first advised me to concentrate on the subject matter of this text, and whose kindness, encouragement and constructive criticism have brought this work into completion.

My intellectual debt to them is invaluable. Much did I learn from Mr Dossers' own work on this subject in particular and the formulation of development plans in general.

I also benefited from the work of Professors R.Frisch, J.Tinbergen, O.Lange, in the National Planning Commission, Cairo. The discussion with my colleagues and friends at the National Planning and Statistical Institutes of the U.A.R., during my visit to Egypt and Syria, proved also to be very illuminating.

Thanks are also due to the very many planning and statistical institutes for providing me with valuable information. Difficult though to name them all, the following are worthy of due consideration: The U.A.R. National Planning and Statistical Institutes, The Oslo Institute of Economics, The Netherland Economic Institute and the Philippines National Economic Council.

To the members of the library staff at the University of Edinburgh I am also very much grateful for many facilities.

It goes without saying, that none of the above mentioned persons, is responsible for any mistakes in this work.

PART ONE

INVESTMENT CRITERIA:

EXPOSITION, CRITICISM AND

THEORETICAL APPRAISAL

'The difficulty lies, not in
the new ideas, but in escaping
from the old ones, which ramify,
for those brought up as most of
us have been, into every corner
of our minds'

J. M. Keynes.

(General Theory)

CHAPTER I

GENERAL INTRODUCTION TO PART ONE:

PROFIT-ORIENTED DECISION CRITERIA AND THE

ALLOCATION OF INVESTMENT IN A DEVELOPING

ECONOMY

1. Introductory Note.

In considering the economic principles which should guide investment decisions in a developing economy, it is not to be forgotten that the earlier discussion of investment criteria neglected, if not omitted, the price mechanism and the private profitability criterion. In point of fact, a more discussion of theoretical investment criteria, as we shall

CHAPTER I

GENERAL INTRODUCTION TO PART ONE:

PROFIT-ORIENTED DECISION CRITERIA AND THE

ALLOCATION OF INVESTMENT IN A DEVELOPING

ECONOMY

The first chapter is to explain why this should have been the case and to introduce the reader with some of the methods of allocation suggested thus far in the literature of development planning.

It is sufficient here to mention that Polak and Buchanan discussed investment methods of allocation in terms of balance of payment and income effects, suggesting that given investment funds including foreign exchange should be used so as to expand the country's export capacity or lead to import substitution.

Similarly, development planners⁽¹⁾ such as A.R. Khan,

⁽¹⁾ Individual references will be given in the preceding chapters expanding the investment criteria as originally suggested and developed by some of the above-mentioned economists and development planners.

CHAPTER I

GENERAL INTRODUCTION TO PART ONE:

PROFIT-ORIENTED DECISION CRITERIA AND THE ALLOCATION OF INVESTMENT IN A DEVELOPING ECONOMY

1. Introductory note.

In considering the economic principles which should guide investment decisions in less developed, but developing countries, it is not surprising to mention that the earlier discussion of investment criteria neglects, if not modifies, the price mechanism and the private profitability criterion. In point of fact, modern discussion of theoretical investment criteria, as we shall see later on, substitutes for the private profitability criterion, other measures such as capital-output, capital-labour ratios, rates of surplus and other highly sophisticated methods of allocation.

Our task in this opening chapter is to explain why this should have been the case and to introduce the reader with some of the methods of allocation suggested thus far in the literature of development planning.

It is sufficient here to mention that Polak and Buchanan have discussed investment methods of allocation in terms of balance of payment and income effects, suggesting that given investment funds including foreign exchange should be used so as either to increase export capacity or lead to import substitution.

Economists and development planners⁽¹⁾ such as A.R.Kahn,

1. Individual references will be given in the proceeding chapters expounding the investment criteria as originally suggested and developed by some of the above-mentioned economists and development planners.

R.Nurkse, W.A.Lewis, H.B.Chenery, F.D.Holzman and J.Tinbergen have recommended that investment projects should be chosen according to "the social marginal product" method of allocation, provided that the general aim of economic policy is maximum immediate expansion in the aggregate level of output.

Other development planners, including M.Dobb, H.Leibenstein, W.Galenson, O.Eckstein and A.K.Sen, are of the opinion that investment projects should be selected according to the investable surplus to which the initial investment give rise, provided that the aim of economic policy is to maximise the rate of capital formation and the rate of growth of output over time.

It would be tempting to proceed discussing the details of the preceding points of view from Polak via Kahn, Chenery, ... etc., to Galenson and Leibenstein who came to the conclusion on the technical form of investment, namely, that capital intensive industries should get high priority even in capital-poor labour-rich countries because they lead to more rapid rate of per capita output via re-investment expansion than less capital using projects. But we will resist this temptation for the sake of not putting the cart in front of the horse.

At this stage it will be more useful to discuss critically the market net rate-of-profit criterion in an effort to sort out its limitations as an appropriate device for investment project selection and comparison in less developed countries seeking economic advance.

2. The net rate of profit as a criterion for assigning priorities.

The net rate of profit rule could be given explicit form as follows:-

$$P = \frac{VO - W}{C} - (i + \frac{1}{d}) \text{ where}$$

P is the rate of profit;

V is the value added per unit of output;

O is the physical output per worker;

W is the wage rate;

i is the rate of interest on the invested capital;

c is the amount of capital required per worker;

d is the life span of the capital equipment.

The prospected rate of return for each single investment project is to be obtained by the previous formula. A discounting⁽¹⁾ factor, then, is to be applied in producing the present value of the future return. Once this is done, all projects or other investment alternatives are to be ranked according to their net rate of discounted return. Obviously, those achieving high rates of net discounted return by the formula are to be selected.⁽²⁾

3. Now, the question is: why the private profitability criterion is not a satisfactory device for investment project selection and comparison?

Although not all writers make the same list of factors for which the market rule is to be modified or substituted by other allocational methods, the following reasons could be given to

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1. The present value of future return can be obtained by using a formula as this:- $PV = R/(1 + r)^n$ where PV is the present value of future income, R is the annual return, r is the market discount rate and n is the number of years in the future when the income is forthcoming.
 2. For a numerical example of the above mentioned formula see, "Production Techniques And Employment Criterion in Underdeveloped Economies" an article published by a group of experts in the International Labour Review, Vol.78, 1958.

support this assertion:-

- (i) Actual market prices are not competitive because of market imperfections arising from monopolistic influences, taxes, tariffs and indivisibilities.⁽¹⁾ Where this prevails the market price of a good or a service do not reflect its intrinsic value to the economy as a whole;
- (ii) private profit estimates do not account for the net benefits arising from economic interdependencies;
- (iii) the net rate of profit criterion (in the private sense) may choose types of investment, though profitable from a private point of view, may not be acceptable from a national point of view;
- (iv) the net rate of profit rule in its static set-up do not allow for dynamic considerations;
- (v) lack of both experience and information in less developed countries may make it difficult for the private sector of the economy acting in a decentralized form to forecast accurately what the anticipated

1. Professor Rosenstein - Rodan has recently distinguished three kinds of indivisibilities as follows:- (a) indivisibility in the production function because of the lumpiness of social overhead capital; (b) indivisibility of demand owing to complementarities;; (c) indivisibility in the supply of savings. For details of exposition the reader is referred to P.N. Rosenstein - Rodan, "Notes on the theory of the 'Big Push'", in Economic Development for Latin America, International Economic Association, 1961, pp 57-81.

rates of return will be.⁽¹⁾ This in addition to the lack of unified and systematic accounting procedures. Governments through its various planning and statistical institutions may have an increasing supply of the required skills;

- (vi) high rates of return (in the private sense) is a necessary condition to attract private foreign capital but it is not a sufficient one to stimulate private foreign capital to move. Other conditions are necessary in addition to high rates of return.⁽²⁾

1. Mrs. Joan Robinson in her book The Accumulation of Capital has pointed out that, "In reality, to find the expected rate of return which governs investment decisions is like the famous difficulty of looking in a dark room for black cat that probably is not there, and to give a true account of realised returns is like the famous difficulty of the chameleon on a plaid rug", *ibid*, p.192. Mrs. J. Robinson's statement may also be valid in cases involving forecasts. But note that the public sector using a special criterion is usually in a "position to forecast future events than the private investor acting independently because of the availability of research facilities and the error term which is really missing in Mr. J. Robinson's statement.
2. Among the factors constituting a favourable climate for foreign investment-from the private foreign investor point of view - are the following: - (a) political stability and freedom from external aggression, (b) security of life and property, (c) facilities for the remittance of profits, dividends, etc., (d) facilities for the immigration and employment of foreign technical and administrative personnel, (e) favourable system of taxation, (f) absence of competition of state-owned enterprises, (g) a general spirit of friendliness for foreign investors. These are the requirements of private foreign investors in addition to the availability of investment opportunities having high profits. Where these conditions are favourable to the borrowing country, private capital has to be stimulated, otherwise, governments have to rely upon foreign aid and public loans. For further details see Higgins, *op.cit.*, P.572. See also, United Nations, Foreign Investment Laws and Regulations in the ECAFE Region, (1950).

- (vii) At the present however, many of the less developed countries have been formulating and implementing development plans. In such a situation the Government or its planning agency "will often wish to modify consumer's power over the pattern of production in the interest of what it considers a preferable path of development, i.e. the development committee's welfare function is substituted for that of consumers acting independently".⁽¹⁾

Since the above mentioned reasons invalidating the net rate of profit rule as an allocational device are important we shall consider some of them in what follows in some detail.

As it is well known, to maintain competitive equilibrium over time some conditions are required. Among these conditions present prices must reflect future as well as present demand and supply conditions. But as mentioned earlier market prices are not competitive because of market imperfections and external economies (which may be technical or pecuniary). Hence, actual market prices cease to be an unsatisfactory signalling device for the distribution of investment or to measure accurately social costs and benefits.

Market imperfections,⁽²⁾ one has to remember, are all pervading

1. See, D.G.M.Dosser, "Savings and Investment in British Colonial Territories", in Proceedings of the Second International Savings and Investment Congress, Brussels: 7-11 September, 1959, p.378.
2. See H.Chenery & K.Kretschmer "Resource Allocation for Economic Development", Econometrica, Vol.24, No.4, October, 1956.
H.Chenery - "The role of industrialization in development programs", American Economic Review, Vol.XLV, May, 1955, pp.40-57. Reprinted in A.Agrawala & S.Singh "The Economics of Under development" Oxford University Press, 1958, pp.450-471.
H.B.Chenery "The Application of Investment Criteria", Q.J.E., Vol.LXVIII, 1953, p.73.

Footnote 2 continued.

See also J.Tinbergen The Design of Development (Baltimore, 1958), pp.39-41, and Annexe, Vol.2.

See also "Some Aspects of Investment Policy in Under developed Countries", International Labour Review, Vol.77, January-June, 1958.

See also W.Galenson & Leibenstein "Investment Criteria, Productivity and Economic Development", Q.J.E., Vol.LXIX, August, 1955.

See also Oscar Lange "The Role of Planning in Socialist Economy", The Indian Economic Review, No.2, August, 1958, pp.1-15.

See also Sayne P.Schatz "Under-utilised Resources, Directed Demand" and Deficit Financing (illustrated by Reference to Nigeria) in the Quarterly Journal of Economics, Vol.LXXIII, November, 1959, No.4.

D.M.Dosser "Theoretical Investment Criteria and Practical Development Planning", Scottish Journal of Political Economy, June, 1962.

For an extensive analysis of external economies and diseconomies, see the following references.

(1) P.H.Hodgson "Problems of Industrialization of Eastern and South-Eastern Europe", Economic Journal, Vol.53, September, 1943.

(2) J.J.Hicks "External Economies and Diseconomies in a Competitive Situation" in the Economic Journal, Vol. LIII, 1953, pp.41-57.

(3) R.Harrod "Problems of Capital Formation in Under Developed Countries" (Oxford, 1955).

(4) J.Hicks "The Concepts of External Economies" in the Journal of Political Economy, Vol.LXII (April, 1954).

(5) J.Hicks "External Economies, Investment and Per capita Income" ibid, Vol.LXII (October, 1954), pp.445-447.

(6) J.Hicks "External Economies and the Doctrine of Balanced Growth", Economic Journal, Vol.LIV, 1955, pp.451-456.

(7) P.Bator "The Anatomy of Market Failure" in the Quarterly Journal of Economics, August, 1955.

everywhere but the markets of less developed countries are more imperfect than those of advanced countries. In labour rich countries for instance the market wage rate may not reflect the productivity of labour. To the extent that this is true, the market wage rate over rates the social value of labour. Furthermore, the actual market rate of interest do not reflect the competitive equilibrium price of capital. Capital in turn may well be more valuable to the country than official interest rates indicate. Also, at official exchange rates there is usually no equilibrium and in most cases, if not in all cases, the demand for foreign exchange at this rate surpasses the supply of foreign exchange. Hence, capital costs will need an upward correction and labour cost will need a downward correction if actual market prices are to reflect the true economic value of the investment project whose costs and benefits are to be assessed.

Now as regard to external economies⁽¹⁾ arising with the development of the project, it is sufficient here to mention that the earlier usage of the concept (Marshall & Pigou) was to explain

1. For an exhaustive analysis of external economies and diseconomies, see the following references.
- (1) P.N.Rosenstein-Rodan "Problems of Industrialisation of Eastern and South-Eastern Europe", *Economic Journal*, Vol.53, September, 1943.
- (2) J.E.Meade "External Economies and Diseconomies in a Competitive Situation" in the *Economic Journal*, Vol. LXII, 1952, pp.54-67.
- (3) R.Nurkse "Problems of Capital Formation in Under Developed Countries" (Oxford, 1953).
- (4) T.Scitovsky "Two Concepts of External Economies" in the *Journal of Political Economy*, Vol.LXII (April, 1954), pp.143-151.
- (5) J.A.Stockfish "External Economies, Investment and Foresight", *Ibid*, Vol.LXII (October, 1955), pp.446-449.
- (6) M.Fleming "External Economies and the Doctrine of Balanced Growth", *Economic Journal*, Vol.LXV, 1955, pp.241-256.
- (7) F.Bator "The Anatomy of Market Failure" in the *Quarterly Journal of Economics*, August, 1958.

decreasing costs in an industry operating under conditions rather different from our own. If, however, the concept pertains to costs and benefits of production not reflected in the price mechanism in its first usage, the "modern version of the concept treats external economics as part of a more general doctrine of direct inter-action relating to inter-dependencies that are external to the price system".⁽¹⁾

Strictly speaking, external economies in growth theory refer to the effects of the investment on the profitability of others. On definition however, external economies are benefits which accrue to the whole community or to some members of it in a way that does not bring a direct return to the investor who undertakes the initial investment. This is merely because the institutional framework does not permit him to charge a price for the by-product benefits the investment made by him brings.⁽²⁾

It is therefore necessary to correct for market imperfections and account for economic inter-dependencies. As Profs. Rosenstein-Rodan,⁽³⁾ Nurkse,⁽⁴⁾ Lewis,⁽⁵⁾ Myrdal⁽⁶⁾ and others have recommended; any calculations of the profitability of a given investment should include the resulting increase in the profitability of investment

1. See, Bator, op.cit., p.358.

2. See, M.Fleming, op.cit. Also, Higgins, op.cit.

3. See, Rosenstein-Rodan, op.cit.

4. See, Nurkse, op.cit.

5. See, W.A.Lewis, "Economic Development with Unlimited Supplies of Labour", Manchester School, May, 1954. Reprinted in A. Agrawala & S.Singh "The Economics of Under Development" (Oxford, 1958), pp.400-449.

6. See, G.Myrdal - Economic Theory and Under Developed Regions - Duckworth, London, 1957.

in other sectors.

In conclusion, we would say that profit-oriented criteria are now challenged as an allocational device on both theoretical and operational grounds. If however it is desirable to use the profit rule as an investment criterion it is necessary to correct it before using it. In other words, if it is desirable to bring individual investment programmes within the framework of marginal analysis, it will be necessary (as we shall see in chapter III of this context where we are discussing the social marginal productivity method) to correct for market imperfections and to account for external economies arising from economic inter-dependencies. In other words if the investment criterion agreed upon is the social marginal product, it will be necessary in applying it as a priority figure for ranking and selecting among a series of investment projects to attach a "shadow" or "accounting" price to the product reflecting the social value attributed to it. And it will be also necessary - wherever the private cost differs from the social cost - to apply a shadow cost. It is these shadow prices and costs which should be used instead of market prices in evaluating the economic value of investment projects.

Along these lines various investment rules have been proposed for the allocation of investment in the now developing countries. In reviewing these methods we have found that most discussions of the subject until recently have concentrated on the single-project approach, i.e. in the Quarterly Journal of Economics.

Part one of the present study examines critically the allocation of investments according to capital-output ratios, social marginal product, marginal per capita re-investment quotients, the

time series criterion and the marginal growth contribution of the project criterion. Data needed will also be discussed in chapter VII along with other considerations connected with the above mentioned methods of allocation. Finally, we state what we consider our main findings to be on the method of choosing investments in the light of the QJE investment criteria discussion.

CHAPTER I

CAPITAL-OUTPUT RATIOS

Introductory Note.

In the economics of development and growth, the capital-output ratio has assumed great importance as a planning device. Since the Harrod-Domar type of growth equation⁽¹⁾ has been brought into the literature, the aggregate capital-output ratio has been used to answer the question of how much total investment is required to achieve a desired target increase in output.

There have been suggestions for using the investment-output ratio as a factor in assigning investment priorities and as a criterion for selecting the appropriate type of

technology in special fields where technical conditions permit

various levels of capital

CHAPTER II

CAPITAL-OUTPUT RATIOS

This chapter reviews critically the investment

output ratio as a tool of economic planning and individual

projects. Some examples are given. Furthermore, it shall

shed some light upon the major conceptual and operational problems connected with the capital coefficient.

The Harrod-Domar growth equation is $\dot{Y} = \frac{I}{K} Y$ where

- 1. \dot{Y} is the growth rate;
- 2. I is the investment rate;
- 3. K is the capital-output ratio;
- 4. Y is the output.

In the light of the above equation the only way to maximize growth is to maximize the saving rate, I/Y , and the capital-output ratio, K . The latter is a function of the growth rate (the Harrod-Domar growth equation) and the coefficient of investment, I/Y . It would be taken to give the same result as the Harrod-Domar equation, given the saving rate, maximum growth could be obtained if the coefficient of investment (output-capital ratio) is held as high as possible.

CHAPTER II

CAPITAL-OUTPUT RATIOS

1. Introductory Note.

In the economics of development and growth, the capital-output ratio has assumed great importance as a planning device. Since the Harrod-Domar type of growth equations⁽¹⁾ has been brought into the literature, the aggregate capital-output ratio has been used to answer the question of how much total investment is needed to produce target increases in output. Furthermore, there have been suggestions for using the investment output ratio as a factor in assigning investment priorities and as a criterion for selecting the appropriate type of technology in special fields where technical conditions permit alternative production processes at varying levels of capital intensity.

This chapter however examines critically the investment output ratio as a method of assigning priorities among individual projects, given the capital available. Furthermore, we shall shed some light upon the major conceptual and operational problems connected with the capital coefficient.

1. The Harrodian growth equation is $G = \frac{S}{C}$ where

- G stands for the growth rate;
- C for the capital-output ratio;
- S for the saving ratio.

In the light of the above equation the only way to maximise G is to minimise C given the saving income ratio, i.e. S. The analogous Domar equation of the growth rate (the product of the saving ratio and the coefficient of investment productivity) could be taken to give the same result. That is to say, given the savings ratio, maximum growth rate of income could be obtained if the coefficient of investment productivity (output capital ratio) is made as high as possible.

2. General concepts and definitions:

The usual definition of the capital coefficient as generally understood among economists is the amount of capital required to produce one unit increment of net output.⁽¹⁾ The incremental or marginal capital-output ratio is the rate at which the net additions to the existing stock of capital is turned into additions to net output.⁽²⁾ Strictly speaking the precise definition of the capital coefficient depends upon what do we mean by both the numerator and the denominator of the coefficient. This however involves great difficulties.

Take, for instance, output. It can be defined and measured in gross and net concepts. Therefore in computing the capital-output ratio one may be confronted with the problems of whether to choose between the value and the volume of production and between gross and net concepts of output. Deciding upon the value the investigator in an under developed country faces the problem of prices if he is to anticipate the future returns on the light of his past calculations. Taking the volume of production he may be confronted with the lack of a uniform unit of measurement and other problems of commodity classifications. Neglecting depreciation by taking the gross value of output in deriving the capital coefficient makes a substantial difference in the value

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1. See, Jan Tinbergen, "The Design of Development", Baltimore, 1958, p.70.
 2. See, H. Leibenstein, "Economic Backwardness & Economic Growth", Wiley, N.Y., 1957.

of the coefficient. The following numerical illustration elucidates the possible difference between the values of the coefficient as being calculated on both gross and net basis.

	(A)	(B)
Value of fixed capital (£)	100	100
Value of annual net output (£)	25	25
Durability of capital (years)	50	10
Capital/net output ratio	4:1	4:1
Capital/gross output ratio	2.9:1	3.7:1

By assumption, in the above example project (A) and project (B) are similar in all other things except in the durability of capital equipment. The equipment in project (A) lasts 50 years. That of project (B) have a life of 10 years.

If one is to choose between the alternatives according to capital-output ratios he may be indifferent between the two types of investment if the calculations are to be derived on net basis. If the durability of the assets is considered in both of the projects under consideration one may choose the long lived equipment if his choice is to be guided with the capital/gross output ratio. In this case, the capital coefficient may be a misleading device if it is computed on gross concepts.

The point of more concern to us is which concept of output one ought to take into account when computing the coefficient, gross or net. In our case it depends on whether the structure of capital is to remain stable or changes in the economy are to occur. If the economy is stable, net output may be the correct procedure. In such a case, depreciation allowances are not needed to shift capital to other sectors in the economy. If

capital is to be shifted to other sectors - in the course of change - it may be desirable to deal with the gross concept of production.

Next we must discuss briefly the concept of capital, the other component of the capital coefficient. In order to place a value to capital one may take either the gross value of existing capital assets minus accumulated capital consumption or the replacement value of existing assets and equipment. Probably, the value of physical assets will differ if it is measured by the first approach rather than if the second approach is adopted.

The difference however can be explained by the changes in the price level. Even if price adjustments are made in measuring the total value of physical assets⁽¹⁾ still two major difficulties to be overcome.

In the first place, the problem of relative price changes. Secondly, other problems may arise when there is a rising trend in real wage rates. The first of the two difficulties is a real problem of measurement and it reflects the inadequacy of index numbers as a device for deriving any constant price series. The second problem is that which still remains even if the first problem is approximately solved. The essence of the problem of lower valuation of capital during a period of rising wages (and vice versa) is that, in a period of inflation the money value of

1. By physical assets is meant assets such as plant and equipment which are devoted to the production and distribution of goods and services and are expected to have a useful life extending over a number of years. For details of measurement see G. May, "Changes in the accounting treatment of capital items during the last fifty years", in Problems of Capital Formation: International Bureau of Economic Research, Studies of Income and Wealth, Vol. 19.

existing long life capital goods tends to be understated. Even if corrections are made by allowing for price changes, still the real value of existing capital assets - produced at a lower level of real wages - would get understated in a period of rising labour productivities.

These, however, are few difficulties connected with the valuation and measurement of fixed assets. We think that "the true measure of capital involved would be the sum total of market value of the equipment and stocks and the depreciation funds accumulated".⁽¹⁾

Furthermore it is not easy to distinguish capital from other factors of production such as land. Does the definition of capital include durable goods and the amount invested in skilled labour through education and vocational training?

Most statistical definitions of capital limits it to tangible and reproducible assets. The standard definition of capital formation according to United Nations methods is "that part of a country's current output and imports which is not consumed or exported during the accounting period but set aside as additions to its stock of capital goods. Net capital formation is distinguished from gross capital formation in that it is measured after allowances are made for depreciation, obsolescence and accidental damage to fixed capital".⁽²⁾

1. See, J. Tinbergen, op. cit., p.70.

2. See, United Nations, "Concepts and definitions of capital formations", Series F. No.3, 1953.

In computing the value of the marginal capital-output ratio; investment as defined above is usually taken. This however, may avoid to some extent the difficulties involved in estimating the average capital-output ratio which needs the measurement of capital in the aggregate sense. But this does not mean that the marginal capital-output ratio does not involve operational difficulties.

Production does not only require fixed capital but also working capital. Therefore, in computing the marginal capital-output ratio the working capital must not be assumed away. But violent fluctuations in inventories might affect the estimates. For this reason it has been suggested that in order to even the cyclical and random fluctuations in inventories and output the marginal capital-output ratio must be taken over a number of years.⁽¹⁾

Because of the difficulty of measuring capital, it has been suggested⁽²⁾ that instead of computing the marginal capital-output ratio it may be easier to compute the marginal savings output ratio. In this case the value of the new investment output ratio is to be derived from the savings coefficient.

It may be easy to calculate the statistical relationship between the rate of savings (adjusted for external borrowings) and the growth of national product. This procedure has two merits. The first is that it saves the problems related to the valuation of capital and its quantitative measurement. Secondly,

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1. See A.Ghosh, "Uses and Abuses of the Capital-output ratio", Economic Weekly, Annual number, 1956.
 2. See A.Ghosh, *ibid.*

it allows for bad investments and preliminary expenses on explorations.

Even if the above procedure is adopted still other problems exist. For instance, the problem of time lags between investment and returns is still unsolved. In a lagged model, imports in period (t) may not produce output in the same period but in period say $(t + 1)$. Therefore, it is necessary to take time periods into consideration. If this is not taken into consideration; investments which have a quick yield may appear advantageous over other investments which may be far better in the long run.

In sum, the capital-output ratio is surrounded by many conceptual and empirical problems. This however, is not only true for less developed countries, where the necessary basic statistical data for the estimation of both capital and output, is still not available, but the case may also include some of the now advanced countries where the concept of capital and income is still encountered by many difficulties. Professor Evertt Hagen for instance has pointed out that, "measurement of ICOR for any given country involves obtaining conceptually comparable wealth estimates for at least two different dates, income estimates for the same dates, and calculating the ratio between the increment in capital and that in income. The dates must be far enough apart in time so that the probable margin of error in the estimate of capital or income at each date is small relative to the increment between the dates. But long income series are available for only a relatively few countries. Measurement of the aggregate capital stock of various countries are even less common, and are imprecise. For these reasons the number of countries is small indeed for which the

necessary set of estimates can be made without a feeling that the statistical margin of error present renders the conclusions very doubtful".⁽¹⁾

It is quite clear from the above statement that in order to derive the capital coefficient, it is very essential to make avail a long series of income and wealth data. (Since this is lacking in many countries it seems of utmost difficulty to derive a base either for projecting capital requirement or for assigning investment priorities.)

One might suggest the use of the capital coefficient which is to be derived from national income statistics available over short periods. But this however is only justifiable if short period data (past five years estimates for instance) are part of a much longer period and the forthcoming planning period will not reflect a long run structural change different than what the past period shows.

But this however seems not to be the case and in most cases especially in less developed countries, future development projections are not a mere reflection of the past.

Furthermore, the danger of the use of short period national accounts data in deriving the incremental capital-output ratio can be seen from the fact that the net investment figures in these accounts are not an accurate measure of the actual increases in the stock of the productive capital.⁽²⁾ The reason is because,

1. As quoted by Professor B.Higgins, op. cit., pp.642-643.

2. See, B.Higgins, op. cit., p.643.

net investment is usually derived from gross investment. In this case, depreciation figures are usually based on accounting concepts rather than on actual depletion of fixed assets.

Finally, one would suggest the use of capital coefficients derived from the experience of other countries where statistics are more complete. This has also its dangers. The wide range of the incremental-capital-output ratio among different countries⁽¹⁾ might make it difficult to decide what would be the appropriate coefficient whether for sectors or for the economy as a whole.

3. The capital-output ratio as a factor in determining investment priorities.

The use of the capital-output ratio as a factor in determining investment priorities has been first suggested by Professors Polak⁽²⁾ and Buchanan⁽³⁾. The former author, for instance, has pointed out that "given the magnitude of capital investment ... it is desirable, from the point of foreign exchange, to maximise

1. Long period data shows that the incremental capital-output ratio varies from 3 in the United States (1879-1953) to 7.4 in the Netherlands (1900-1952). Even for individual countries the average ratios hide wide fluctuations. For Britain for instance, the ICOR ranges from 8.4 for the decade 1885 to 1895 to 0.4 for the period 1905 to 1909. Short period data for less developed countries show a range from 1.8 in Czechoslovakia (1948-1953) to 2.5 for Poland (1950-1955). All the figures mentioned are as quoted by Professor Higgins. For reference see, Higgins, op. cit., p.645.
2. See J.J.Polak, "Balance of Payments Problems of Countries Reconstructing with the Help of Foreign Loans", in the Quarterly Journal of Economics, Vol.LVII (Feb. 1943), pp.208-40.
3. See N.S.Buchanan, International Investment and Domestic Welfare (New York, 1955).

output and thus the rate of turnover⁽¹⁾ and also to minimise the investment required in order to keep the service of the debt down".

It is apparent from the above statement that the recommended types of investment projects are those requiring the least amount of capital. Furthermore, investment projects producing commodities for exports would have higher priority. In view of Professor Polak's line of thought all the proposed investment projects are to be classified according to the final product of each. The ultimate choice then depends on the amount of capital investment initially required and the net contribution to the balance of payment.

A similar point of view to the above was also suggested by Prof. Buchanan who has pointed out, "... if investment funds are limited, the wise policy in the absence of special considerations, would be to undertake first those investments having a high value of annual product relative to the investment necessary to bring them into existence".⁽²⁾

According to the capital-output ratio rule; investment projects are to be ranked according to minimum requirements of capital per unit of discounted net output. Projects having the lowest cost of capital per unit of discounted net output are to be selected for implementation up to the exhaustion of the capital available. To sum up, here you have a given amount of investment

1. Prof. Polak has defined the rate of turnover of capital as "the value of annual output divided by the value of capital used to produce this output", *ibid*, p.208.

2. See, Buchanan, *op. cit.*, p.24.

and you want to make the best use of it. If the capital-output ratio is the allocational device, establish the priority system accordingly, and select the project set maximising output at minimum capital cost. The weaknesses of this method are discussed in the next section.

4. Theoretical appraisal and criticism.

That the allocation of capital investment according to the capital-output ratio rule maximises the total value of future output is a question open to criticism. In other words the distribution of investment resources according to this rule may not maximise the total value of output. Maximising the productivity of the scarce factor is not the only requirement for maximising the total output. Why not maximising the productivity of the abundant factor beside that of the scarce factor if the policy objective is maximum total output?

Of course total output can be expressed as output of any factor multiplied by the number of units of that factor. But this does not mean that maximising the productivity of that factor would lead to maximum total output. To illustrate the point, the following clarification may be of help.

Divide total output into one part, let it be O_1 . Assume that this part of output is to be produced by workers L_1 (in optimal combination with capital). The other part of output, let it be O_2 , is to be produced by the remaining labour supply with little or no capital. Is it not clear that $O_1/L_1 + O_2/L$ will always exceed O_1/L_1 , so long as capital is scarce relative to labour.⁽¹⁾

1. See, Higgins, op. cit., p.634.

Even if it is correct to say that the allocation of capital investment according to capital-output ratios would maximise the present value of future output, this does not mean that the rule is appropriate for attaining this maximum over time. In other words, if the goal of development policy is maximum rate of growth over time, the capital-output ratio becomes no longer the appropriate device.

In such a situation what should be compared in choosing among investment opportunities is not the project's incremental capital-output ratio but the project's contribution to income during a crucial period.

The following hypothetical example could be given to illustrate the above concept. Suppose that we have two investment projects, Project (A) and Project (B). The initial investment in each is equal to the amount of £1000. Other figures characterising the two projects are exhibited in the following table:

	Investment A	Investment B
Initial Investment £	1000	1000
Annual Output £	400	200
Investment life (years)	4	20
Annual straight-line depreciation	250	50
Total output over investment life	1600	4000
Capital-output ratio	2.5	5.0

It is evident that in each case, net output per annum is £150. The question confronting us is which investment project yields the greater increase in national output? If, however, we are to be guided by the capital-output ratio rule, Project (A) is the choice. But such a choice would not achieve the maximum yield per unit of capital over time.

To illustrate the point, let us overlook other costs than that of capital. Discount the output stream by using a discounting factor (let it be the market rate of interest for the time being). If, however, the market rate of interest at this time is 5%. In this case, the present value of the income stream of investment (A) would be £1420 (£400 for 4 years). That of investment (B) worth £2490 (£200 for 20 years). Clear it is, that in this case investment (B) not investment (A) should be the choice. The capital-output ratio in this case is by no means the guiding device.

Now, the problem which confronts us is what discounting factor we have to use? We have already pointed out that the pure market rate of interest is likely to understate the social cost of delayed increases in output in less developed countries. Hence, it may be appropriate to use an imputed rate of interest.

Again, what are the main features of an economy the capital-output ratio method is designed to meet? Implicitly, the discussion relates to "one of great scarcity of one factor, abundance of another, where market prices do not reflect this".⁽¹⁾

1. D.M.Dosser, op. cit.

This however would characterise not all of the less developed countries. Capital is not only the scarce factor in low-income countries. But it may be in actual development planning, less of a bottleneck than administrative processes of organising projects, moving labour, and breaking down social barriers. Therefore, the capital-output ratio does not include all less developed countries but excludes others where capital is not the scarce factor.

Furthermore, it can be also argued that if it is a matter of scarcity of some factors, abundance of others, why not the case also cover developed countries in depression periods where the distinguishing mark is large pools of unemployed labour?⁽¹⁾ It is however by no means correct to consider factors which are so plentiful as free goods. Hence, the main defect of the capital-output ratio is that it neglects the cost of employing labour in operating the capital.⁽¹⁾

Now, what other factors which may belittle the capital-output ratio as a factor is determining investment priorities? This can be seen from the case where the system of priorities is to be established on the light of the capital-output ratios of individual projects. Because in this case if we use the individual ratios we ignore the necessary concomitant expansion in sectors which supply current inputs and in social over-heads. If all these adjustments are to be taken into account a comprehensive capital-output ratio should be used. In this case,

1. See, D.Dosser, op. cit.

it would be necessary to add all the final outputs of the other sectors in order to compare with total capital requirement.

This aggregation raises the problem of what product prices to use.⁽¹⁾

5. Concluding Remarks.

All-in-all, if it is desirable to use the capital-coefficient as a planning device, the following remarks should be born in mind:-

- (a) The measurement of the incremental capital output ratio should be attempted where national income and wealth data are available for long periods.
- (b) For the ease of measurement, it may be desirable to derive the capital coefficient from a saving coefficient. This is because it may be much easier to calculate the statistical relationship between the rate of savings and the growth of national income than if the calculations are to be made on capital bases.
- (c) The capital coefficient may change over time and its rate of change will depend on the operation of the whole system. As Prof. A.Smithies has recently asserts, "to assume a given capital-output ratio in advance is to assume away most of the problem".⁽²⁾ Therefore, potential increase in output must not be equated by the potential increase in capital. Furthermore, if the

1. See, D.Dosser, op. cit.

2. See, A.Smithies, "Productivity, Real Wages, and Economic Growth", Quarterly Journal of Economics, Vol.LXXIV, May, 1960, p.161.

hopes of the now developing countries are to be realised output must increase faster than capital.

- (d) In calculating the coefficient on net basis, the estimates of net investment should reflect accurately the actual increases in the stock of productive capital. Furthermore, the estimates should reflect the actual depletion of fixed assets.
- (e) The investment-output ratio should be used only to determine total capital requirement and even for this purpose it is only a rough indicator.
- (f) For establishing investment priorities among sectors and individual projects; the ICOR is of limited use.
- (g) As a criterion for determining the technical form of investment it is only one of the other alternatives.

All-in-all; the capital-output ratio rule is surrounded by many conceptual and empirical problems. Hence, if it is to be used in predicting the future development of a country or a particular sector within the economy, it should be handled with great care.

CHAPTER III
ON THE SOCIAL MARGINAL
PRODUCT METHOD OF ALLOCATION
(SMP)

Introductory note

The object of this chapter is to examine critically the "SMP" method of allocation as an important criterion for ranking and choosing among investment projects.

The SMP method of allocation has been advocated by many economists. For instance, Prof. A.E. Kahn⁽¹⁾ has pointed out that "from the point of view of the society as a whole, the correct criterion for ranking investment projects is the social marginal product, or the maximum social return to the social marginal investment in the project".

CHAPTER III
ON THE SOCIAL MARGINAL
PRODUCT METHOD OF ALLOCATION
(SMP)

Prof. J. H. Chamberlain has also advocated that, "Economic theory calls for an efficient allocation of investment resources in accordance with the social marginal productivity of capital in its various uses".⁽²⁾

The SMP criterion has also been recommended by Professors J. Tinbergen,⁽³⁾ F. H. Coase,⁽⁴⁾ F. Durand⁽⁵⁾ and others.⁽⁶⁾ This chapter however discusses the SMP method of allocation as worked out by J. Chamberlain.

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1. Prof. A.E. Kahn, "Investment Criteria in Development Programmes", in the Quarterly Journal of Economics, vol. LXVII, Feb. 1954, p. 35.
 2. Prof. J. H. Chamberlain, "The Application of Investment Criteria", in the Quarterly Journal of Economics, vol. LXVIII, 1955, p. 73.

CHAPTER III
ON THE SOCIAL MARGINAL
PRODUCT METHOD OF ALLOCATION
(SMP)

1. Introductory note.

The object of this chapter is to examine critically the "SMP" method of allocation as an investment criterion for ranking and choosing among individual investment projects.

The rule under consideration has been advocated by many economists of repute. For instance, Prof. A.E.Kahn⁽¹⁾ has pointed out that from the point of view of the society as a whole, the correct criterion achieving the maximum social return is the social marginal product, related to the national income as a whole.

H.B.Chenery also has voiced the proposition that, "Economic theory tells us that an efficient allocation of investment resources is achieved by equating the social marginal productivity of capital in its various uses".⁽²⁾

The SMP criterion has also been recommended by Professors J. Tinbergen,⁽³⁾ F.Holzman,⁽⁴⁾ R.Nurkse⁽⁵⁾ and others.⁽⁶⁾ This chapter however discusses the SMP method of allocation as worked out by H.Chenery.

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1. See, A.E.Kahn, "Investment Criteria in Development Programmes", in the Quarterly Journal of Economics, vol.LXVII, Feb. 1951, p.39.
 2. See, H.B.Chenery, "The Application of Investment Criteria", ibid, vol.LXVIII, 1953, p.73.

3. See, J.Tinbergen, "The Relevance of Theoretical Criteria in the Selection of Investment Plans", in Investment Criteria and Economic Growth, Center for International Studies, Massachusetts Institute of Technology, Cambridge, Massachusetts, Dec. 1955; and his book, The Design of Economic Development, op. cit.

Prof. Tinbergen has conceived the idea that priority figures generally will have to be the ratio of 'net results (defined as the difference between returns and total costs) to total cost, all taken at accounting prices. His criterion however, differs from that used by the private investor by:-

- (i) the application of accounting prices;
- (ii) consideration of indirect and secondary costs and returns; and by
- (iii) relating results to total costs and not only to the costs of capital invested. (In cases where capital is the only scarce factor Prof. Tinbergen has mentioned that the priority figure will have to be the ratio of net results as defined above to the costs of capital invested).

4. See, F.D.Holzman, "The Soviet Ural-Kuznetsk Combine: A Study in Investment Criteria and Industrialization Policies", in the Q.J.E., vol.LXXI, 1957, pp.368-405.

Prof. Holzman's criterion takes into account:-

- (i) social economies and diseconomies;
- (ii) the rate of growth; and
- (iii) the time horizon of planning.

5. See, R.Nurkse, "Problems of Capital Formation in Under-developed Countries", Oxford, 1953, pp.136-137.

There he has pointed out that, ".... when additional capital becomes available to a country, the country will want or should be urged to invest it in the form that yields the highest possible return, taking into account any external economies created by the project as well as the direct commercial yield", p.136.

6. For a comprehensive discussion of benefit-cost analysis in both theory and practice the reader is referred to: McKean, R.N., "Efficiency in Government through System Analysis", (New York, J.Wiley & Sons, 1958) and Eckstein, O., "Water Resource Development; The Economics of Project Evaluation", (Harvard University Press, 1958).

2. The SMP criterion as worked out by Prof. H.Chenery.

Attempts to measure total capacity effects of various investments along with other effects on the balance of payment, the population and the distribution of income, have not been undertaken in any country.

Chenery's calculations of the social benefit of individual investment projects are only limited to show the investment effect on national income and the country's balance of payment. The formula⁽¹⁾ of social marginal product as worked out by him is as follows:-

$$SMP = \frac{V}{K} - \frac{C}{K} + \frac{rB}{K} \quad (1.1)$$

SMP^2 is the average annual increment in national income (plus balance of payment equivalent) from the marginal unit of investment in a given use;

$\frac{V}{K}$ is the value added domestically per unit of investment;

$\frac{C}{K}$ is the total operating cost per unit of investment;

$\frac{rB}{K}$ is the balance of payments premium per unit of investment.

The details of the above elements in the SMP formula as worked out by Chenery is as follows:-

1. The Social value Added Domestically: i.e., V where

$$V = (X + E) - Mi \quad \text{where}$$

1. See, Chenery, op. cit. p.83, equation 4. Chenery's formula has been simplified by Holzman as follows:-

$$SMP = \frac{X}{K} - \frac{C}{K} + \frac{E}{K}, \text{ where,}$$

X is the increased market value of output;

C is the total cost of production;

E is the value added due to external economies, and

K is the increment to capital (investment).

See, Holzman, op. cit., p.390.

X is the increased market value of output; taxes and subsidies eliminated;

E is the value added due to external economies;

Mi is the cost of imported inputs.

2. The value of total operating costs: i.e. C where

$$C = L + Md + O \text{ where}$$

L is the cost of labour;

Md is the cost of domestic inputs;

O all other costs including replacement of capital.

3. The Balance of Payment Effects: i.e. rB

$$rB = r(aB_1 + B_2) \text{ where}$$

r measures the average over-valuation of the national currency at the existing rate of exchange;

a the cost of combined amortization and interest rate of current borrowing;

B₁ is the effect of installation of investment on the balance of payment; and

B₂ is the effect of operation on balance of payment.

4. The amount of initial investment: i.e. K.

Formula (1.1) in its detailed form can be written as follows:-

$$\begin{aligned} \text{SMP} = & \frac{X + E - Mi}{K} - \frac{L + Md + O}{K} \\ & + \frac{r}{K} (aB_1 + B_2) \end{aligned} \quad (1.2)$$

or,

$$= \left(\frac{V}{K} \cdot \frac{V-C}{V} \right) + \frac{rB}{K} \quad (1.3)$$

From formula (1.3) it is clear that the SMP method of allocation as worked out by Prof. Chenery is the product of the rate of turnover and the percentage margin of social value over cost plus the effect on the balance of payment.

In view of the afore-mentioned method; investment projects are to be ranked according to their SMP's. Those achieving a high rate of social return are to be selected for implementation up to the exhaustion of available investment funds. But note that in an over-all investment programme, "it is sufficient to rank projects in order of their social value, determine the marginal project from the total funds available, and exclude all lower-ranking projects".⁽¹⁾ Clearly, the SMP here serves as a cut-off point. Table No.(3-1) illustrates numerically the SMP of industrial projects in Greece as worked out by Chenery.

3. Theoretical appraisal and criticism.

As mentioned earlier the SMP method of allocation corrects for market imperfections and accounts for external economies. Chenery for instance has corrected for the price effects of indirect taxes and subsidies by taking the social value of the domestic product of the project as equal to the cost of importing the same product. Furthermore he did other corrections for regulated prices and for idle resources. More generally he has pointed out that "when the investment will make possible the utilization of resources which would not otherwise be used (or used for less valuable purposes) only the social cost of utilizing the resources should be changed rather than the total rent or wages which a producer may pay".⁽²⁾

The essential point is that "deducting indirect taxes does not

1. See, Chenery, op. cit, p.79.

2. op. cit., p.82.

Table No.(3-1)
SMP of Industrial Projects in Greece

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Lignite Mining Briquetting	Nitrogenous Fertilizers	Cement	Phosphate Fertilizer	Sulphuric Acid	Glass	Refractories	Soda
Investment (000's) (K)	23,350	17,000	6,750	2,450	1,450	2,800	650	3,500
(a) Capital Turnover $\left(\frac{V}{K}\right)$	.83	.62	.93	.74	.52	.86	1.16	.41
(b) Cost Ratio $\left(\frac{C}{K}\right)$	-.36	-.29	-.37	-.37	-.11	-.43	-.82	-.27
(c) Balance of Pay $\frac{Br}{K}$	.33	.35	.07	.07	-	-.04	-.03	+.09
(d) Value Margin $\frac{V-C}{V}$	.56	.56	.60	.49	.79	.50	.29	.34
SMP	.80	.73	.63	.44	.41	.39	.31	.23

leave the product price at a level corresponding to a no-tax situation".⁽¹⁾ In other words relative prices do not necessarily change to the extent of the subsidies and taxes involved. Hence, there is no way of saying a priori whether adjustment for taxes and subsidies will give a price picture which is closer to the one that would exist in the absence of those taxes and subsidies. Furthermore it is practically impossible to correct for monopolistic imperfections.

Also, Chenery values labour at the increase in consumption whereas the correct procedure which should be used is to value idle resources which would not otherwise be used at their social opportunity cost. Furthermore other corrections may be necessary, the most important of which, are that for underutilized resources and the extra social overhead required to maintain the labour force. Although Chenery argues that these corrections may not be of great importance he admits the drastic effects of the disguised employment in agriculture and trade in underdeveloped countries on the SMP of the project.

The SMP method, however, as interpreted and applied by Chenery was only restricted to compute the average product for the project as a whole. If this is the procedure, a better name of the SMP then would be "The social average product".⁽²⁾ In this sense, it is not a proper criterion for determining the scope or scale or even selecting the proper technique for individual projects. The reason is because; the maximization of the average product for the project may result

1. See, D.M.Dosser, op. cit.

2. See, O.Eckstein, 1957, QJE article, op. cit, p.59.

in failure to take into account the full economic potential of the project.

Therefore, if it is desired to take a decision within a project, the following principle should be applied "undertake all investments within each project which yield an SMP greater than the SMP of the marginal project of the programme".⁽¹⁾

But it ought to be remembered that if it were possible to measure each project's social marginal productivity directly, the SMP rule would constitute automatically the priority criterion we are looking for. In the theoretical plan we have learned that the proportion of net value added directly and indirectly is the investment project effect on national income. The reason is simply because the undertaking of any investment project, let it be for instance, the construction of a new factory for the production of nitrogenous fertiliser; will effect the economies productive capacity, the balance of payments and the distribution of income. The investment effect on the country's capacity to produce can best be illustrated in three ways:-

(i) By adding a net value added to the domestic product.

Let this be the internal capacity effect of the investment and it represents the individual factory direct contribution to the domestic product.

(ii) By adding a net value added to the domestic product due to external economies and diseconomies.

1. See, O.Eckstein, 1957, QJE article, op. cit, p.59.

(iii) Finally, by adding a net value added to the national income due to the substitution effect⁽¹⁾ of the investment under consideration.

The last two points can be labelled together under the complementary and substitution effects of the new investment and can be called the external capacity effect of the new investment project. The measurement of both the internal and external capacity effects provides a measure for the total capacity effects of the various forms of investment. If it is, however, possible to have an accurate measure, for each individual investment project, this total capacity effect along with other effects on the balance of payments, the distribution of income, the resultant figure will form a base for assigning priorities. This will be of great help to the Government or its planning agency in fixing subsidies that would compensate for lower profit rates of projects which would otherwise be chosen by individual investors.

But, the social marginal productivity of single investment projects can be only indirectly assessed. Chenery's attempt is only limited "to determine the marginal project from the total funds available".⁽²⁾ Hence, from a practical point of view, the margin of net value added directly and indirectly by each individual investment

1. In full employment economies this effect will be negative if the workers of the new factory come from other firms in production. But, in less developed countries the substitution effect of the investment will be undoubtedly positive. This ~~is~~ because, the transference of labour from fields in which productivity is low (such as in agriculture) to others where labour productivity could be increased would increase in turn the total social dividend.

2. See, Chenery, 1953 article, op. cit., p.79.

project "is even more of an "empty box" than other cost elements".⁽¹⁾

Now the question is; what policy objectives the SMP rule is designed to achieve? As its predecessor the capital output ratio rule, maximum increase in output as fast as possible. But maximum increase of present output at a point of time might not be a sufficient development goal if the society's aim is maximum rate of growth of output over time.

If this is our target, the SMP method of allocation becomes no longer the appropriate criterion for choosing investment projects that would maximize the rate of growth of output per head of population over a crucial period of time. This is because, the SMP rule is backed by the ceteris paribus assumption, based on a static point of view where the developmental process itself involves dynamic changes.

Finally, the SMP approach neglects the proper timing of investment. The time factor however is a missing point in the static criteria and it should be taken into account for at least two main reasons:-

- (i) In the first place, there are differences in the period required for construction, and the time that elapses before the products become available;
- (ii) Secondly, there are differences in the rate of physical depreciation.

1. See, Paul N. Rosenstein-Rodan, "Programming In Theory and In Italian Practice", in Investment Criteria for Economic Growth, (Cambridge, Mass., 1955), p.25.

4. Concluding remarks.

In conclusion, although the social marginal productivity method is encountered by many difficulties whether conceptual or operational, it might have wide applicability as a criterion for determining the scale of priorities and for choosing the appropriate type of technology.⁽¹⁾ But it would be much better to use the method for assigning priorities between sectors not individual investment projects. This is because of two main reasons as follows:-

- (1) Cross-elasticities of demand, like food, clothing, housing, can be assumed to be very low between sectors not between different goods within a sector (food varieties).

Furthermore, it may be easier to project future demand for the products of a given sector rather than to make forecasts with regard to the final demand on the products of projects within a given sector. In the latter case, projections of future demand will have to be very flexible.

- (2) Secondly, for the sake of measurement, it may be much easier to have reliable estimates for complementarities between sectors than between individual projects within a sector.⁽²⁾

1. "By and large the most suitable technologies are likely to be those which yield the maximum social return per unit of capital, reckoning labour at its social cost rather than market cost. In many instances this means that the answer probably lies in the direction of choosing the simplest of alternative techniques ... the smallest type of plant consistent with technical efficiency, the technology that makes the best use of the most plentiful factors of production. Multi-storied factories are usually inappropriate in areas where land is abundant; wheelbarrows may be more suitable than conveyor-belts where capital is scarce and the marginal productivity of labour in traditional occupation is near zero." United Nations: Processes and Industrialization, 1955, p.48.

2. See on this point Prof. P.N.Rosenstein previously mentioned article, p.25.

Those however who advocate⁽¹⁾ the rule have also proposed three corollaries to be used as practical guides to investment policies in under developed countries. These are⁽²⁾:-

- (1) a given amount of investment should be distributed in a manner that maximizes the ratio of current output to investment;
- (2) those investment projects that will provide idle labour with greater opportunities of work should be undertaken; and
- (3) those investment projects which would increase the ratio of export to investment should be selected.

Therefore, if our aim is to maximize immediate output investment should be allocated where they will earn the highest possible social return. Imputed external economies and diseconomies should be included and also the necessary corrections for the distorting effects in existing market prices.

Generally speaking, and as we have already mentioned, if it is desirable to bring investment programmes within the framework of marginal analysis and if the investment criterion agreed upon is the social marginal product, it will be necessary in applying it, to attach a shadow price to the product to reflect its social value, and it will also be necessary - wherever the private cost differs from the social cost - to apply a shadow cost. It is these shadow prices and costs that should be used instead of market prices.

1. See Kahn, op. cit. See also Chenery, op. cit.

2. See in particular, Galenson and Leibenstein, "Investment Criteria, Productivity and Economic Development", in the QJE, vol.LXIX, August 1955, p.346 and G.M.Meier and R.E.Baldwin, "Economic Development", p.344.

If however, it is assumed that the marginal social return of other inputs but capital is nil, the total value of output can be imputed to capital and if also it is assumed that our over-riding objective is to maximize the immediate value of output, the SMP criterion may be the appropriate criterion for assessing the merits of investment projects.

If however, our object is to maximize the future rate of growth of per capita output, the SMP criterion is no longer the correct device. As mentioned earlier, the SMP criterion in its static equilibrium state is only appropriate if it is backed by the ceteris paribus assumption. But, "as soon as we leave the theoretical world of statics, maximizing output is no longer a sufficient criterion, nor does efficiency have the same meaning".⁽¹⁾

In the forthcoming chapter however, we shall seek to indicate other development objectives than maximizing the immediate total output and to examine the kind of investment criterion which have been suggested to be used when the object of undertaking the investment is to accelerate the future rate of savings and hence future level of investment.

Before shifting to the next chapter it should be kept in mind that the SMP criterion pre-supposes that an optimum distribution of income would be attained by purely fiscal means. Other problems caused by imperfect forecasting and ex-ante co-ordination of investment decisions are completely disregarded. These however, are matters which may involve great difficulties especially in countries which are still undeveloped. In such countries it may be difficult to maintain a satisfactory income distribution by fiscal means. Moreover the population factor may inhibit the application of the SMP rule.

1. See, Galenson, Leibenstein, op. cit.

CHAPTER IV
ON THE MARGINAL PER-CAPITA
RE-INVESTMENT CRITERION
(MPCRIQ)

CHAPTER IV

ON THE MARGINAL PER-CAPITA

RE-INVESTMENT CRITERION (i.e. MPCRIQ)

1. Introductory note.

"The marginal principle, as a principle of allocation, can be applied here as well as anywhere else, but it is not the usual marginal productivity principle ... the best allocation of investment is achieved by equating the discounted value of the general investment stream in the various uses to which the investment is put. What we have in mind is that the marginal unit of capital leads to a general re-investment stream per capita at the margin in every other use. Obviously, it is not the marginal aspect that is unique to our criterion but rather what it is that is to be valued at the margin."⁽¹⁾

With the above statement in mind, in this chapter, we shall critically examine the marginal per-capita re-investment criterion. The aim of economic policy, one has to remember is not maximum total immediate output as it is the case in the SMP method of allocation, but the policy objective is to attain a level of economic capacity

1. See, H. Leibenstein, "Economic Backwardness & Economic Growth", (New York, 1957), p. 268.

that would maximize the rate of growth of per-capita output, whether at a determined period of time, or over time. Consequently, investment projects should be selected according to the investible surplus to which the initial investment give rise. The remainder of this chapter discusses the Galenson - Leibenstein re-investment criterion.

2. The "MPCRIQ" criterion and its exposition as worked out by Profs. Galenson and Leibenstein.⁽¹⁾

Following the proponents of this criterion we assume:-

- (1) A fixed amount of investment irrespective of the technique chosen;
- (2) the income that is to be generated from the initial investment consists of wages and profits;
- (3) the marginal propensity to save of the wage-earners is zero;
- (4) the marginal propensity to consume of the profit-receivers is also zero;
- (5) labour productivity is a function of capital intensity; and finally
- (6) no time lags.

Given the above assumptions, the following factors determine the marginal per capita re-investment criterion:-

- (1) Gross productivity per worker;
- (2) wage goods consumed per worker;
- (3) replacement and repair of capital;
- (4) increments in output as a result of non-capital using innovations (i.e. improvements in skills, health, energy, discipline, and malleability of the labour force);

1. See their afore-mentioned article, QJE, 1955.

- (5) declines in the death rates;
- (6) declines in the birth rates; and
- (7) the direction of re-investment.

The rate of re-investment can be calculated by the formula⁽¹⁾:-

$$r = \frac{P - e.W}{C}$$

where:

- r = the rate of creation of investible surplus;
- e = number of workers per machine;
- W = real wage rate;
- C = cost of machine.

Profs. Galenson and Leibenstein formula can be converted into the Harrod-Domar⁽²⁾ growth rate formula in the following way:-

If, for instance, we divide both the numerator and denominator of the right-hand side of Profs. Galenson and Leibenstein formula by P , we get

$$r = \frac{\frac{P}{P} - \frac{e.W}{P}}{\frac{C}{P}}$$

1. The above mentioned formula is derived from the following formula:-

$$Et + 1 = Et \left(1 + \frac{P - e.W}{C} \right)^t$$

where:

$Et + 1$ = total employment in period $(t + 1)$;

Et = initial employment in period (t) ;

The rest of the notations have the above mentioned meaning. For details the reader is referred to Profs. Galenson and Leibenstein QJE article, p.357.

2. Compare in this connexion, A.K.Sen, "Some notes on the choice of capital intensity in development planning", Quarterly Journal of Economics, vol.LXXI, 1959, p.565.

$$= \frac{1 - \frac{e \cdot W}{P}}{\frac{C}{P}}$$

= $\frac{\text{the rate of surplus per unit of net output}}{\text{the capital coefficient}}$

Clearly, the above formula is similar to the Harroddian growth equation, namely

$$r = \frac{S}{a}$$

where:

r = the rate of growth;

S = the saving ratio;

a = the capital coefficient.

Hence, if we maximize the term $[(P - e \cdot W) / C]$ in Profs. Galenson and Leibenstein formula, we will be maximizing the rate of growth, provided that all wages are consumed and all profits are re-invested.⁽¹⁾

3. The Re-investment Criterion and the population factor.

One of the merits of the re-investment criterion is that it considers the population factor as an endogenous variable. Changes in this factor affect the investible surplus per capita. If however, the labour force grows at a more rapid rate than that at which capital accumulates; the amount of the surplus to be re-invested per worker declines. Therefore, investments that would lower birth rates or the propensity to have children (which is remarkably high in under-

1. John Moes is of the opinion that what should be maximized is not the rate of investible surplus but the productivity of investment. For his views on this point: See, John Moes, 'Investment Criteria, Productivity and Economic Development', Quarterly Journal of Economics, vol.71, 1957, p.161.

developed countries) should get high priority.⁽¹⁾

For the above reasons, the proponents of the re-investment criterion have recommended industrialization in order to promote urbanization.⁽²⁾ They have claimed rural-urban migration in order to reduce the fertility rates in the agricultural sector. They are however aiming at an optimum rate of urbanization. This rate of urbanization is that rate which is consistent with maintaining higher

1. Mr. H.Villard is of the opinion that investment in factories which make birth control devices are more effective in decreasing the population rate of growth than achieving the required decrease in fertility rates through urbanization. See, H.Villard, Investment Criteria, Productivity and Economic Development, the Quarterly Journal of Economics, vol.71, 1957, p.471.
2. In this connection, one may argue, that urbanization involves social costs which reduces the re-investible surplus and hence the rate of growth. It is therefore necessary to take these costs into account. Urbanization costs can be estimated by the following formula:-

$$U = \left[(h + F) (1 + d) + (t + a) \right] (1 + S)$$

where:

U = investment needed by the economy occasioned by the movement of an additional person to an urban location;

h = the capital cost of housing per person;

F = the capital cost for other urban facilities required per person;

d = number of dependents per gainfully employed;

t = the cost of retraining a migrant;

a = compensating capital investment in agriculture per worker withdrawn; and

S = number of "secondary" migrants per "primary" migrants.

See for a detailed discussion of the above formula, Grossman, 'Some Current Trends In Soviet Capital Formation', in Capital Formation and Economic Growth, National Bureau of Economic Research, New York, 1955, p.190.

wages and productivity under general social conditions conducive to fertility decline.⁽¹⁾

4. The re-investment criterion and the choice of the technical form of investment.

As mentioned earlier the Galenson - Leibenstein criterion suggests the choice of capital-intensive projects. This is because the adoption of capital intensive methods of production increases the net surplus for further re-investment and hence would augment the growth of employment opportunities in the economy.

To support their point of view the authors have applied their criterion which they have produced to "dispose first of the popular arguments that allocation of investment to labour-intensive industry is a special desideratum where surplus population exists"⁽²⁾ to some practical cases.

On the assumption that a specific product can be achieved or manufactured under alternative combination of labour and capital they have proved that the adoption of capital-intensive techniques in production processes is more effective in attaining high levels of output and employment.

According to their results; the amount of employment that is to be provided over a period of 25 years by an initial investment of 1,200 Indian Rupees in cottage industry (hand looms) is far less than the employment provided if the same amount of investment has been invested in large scale modern mills. In the case of cottage industry (the

1. See, Galenson and Leibenstein, op. cit., p.365.

2. See, Galenson and Leibenstein, op. cit., p.356.

labour-intensive method of production) employment is only provided for 35 workers over the whole period. On the other hand, where capital-intensive methods of production are initially used; employment opportunities have been provided for 5 persons only in the initial period and for about 1,200 workers after 25 years.⁽¹⁾

Accordingly and in view of Profs. Galenson and Leibenstein; capital-intensive industries or processes should get high priority in capital - poor labour - rich countries because they lead to more rapid rate of growth of per capita output via re-investment expansion than less capital using projects.

5. Theoretical appraisal and criticism.

As it may be apparent from the previous exposition of the marginal per capita re-investment criterion Profs. Galenson and Leibenstein have attempted not only to secure the best use of limited capital resources but also to increase their supply over time.

If, however, the assumptions upon which this criterion are met in practice, the country adopting such a policy secures an increasing supply of potential savings and hence an expanding rate of its per capita output over time. Through investing and re-investing the profits that are to emerge from the initial investment in producing capital goods, this investment policy will have a growth-inducing effect on the whole economy.

In other words, through adopting up-to-date capital intensive methods of production; productivity would be higher and through re-investing in capacity generating types the rate of growth of

1. Compare the original data calculated by Profs. Galenson and Leibenstein, op. cit., p.359.

output would be faster. Employment though it may not increase very much immediately, is bound to increase at a faster rate.

Furthermore, an investment policy as this under consideration will develop a well established urbanized sector. This in turn will encourage the transference of rural population whose productivity is very low to the industrial sector where their productivity will increase. Through the new industrial environment, the workers can learn new modes of life. Their human faculties, traits, investors, teacher of skills, savers and disseminators of new ideas can develop.

The present writer however would assert the great need to develop such quantum of growth agents in less developed countries. And he thinks that if the investment policy of less developed countries is to be directed in the light of the re-investment criterion, the country might be able to transfer its economy from a 5 per cent saver to a 15 per cent saver. Furthermore, one should add that this criterion might help in transforming the country from an 80 per cent farmer to 15 per cent farmer.⁽¹⁾ Finally, the country might also develop the Schumpeterian entrepreneur.

The marginal per capita re-investment criterion in addition to its saving potential, creative capacities, it has also its effects on the population factor. Through taking the people out of their former context to where new industries are to be developed, they can break the cake of custom and develop their new aspirations.

1. Professor Hans Singer has defined the process of economic growth "as one of transforming a country from an 80 per cent farmer to 15 per cent farmer": See, H.Singer, "The Concept of Balanced Growth and Economic Development: Theory and Facts", University of Texas Conference on Economic Development, April, 1958, p.6.

Once they are motivated by high standards of living their scale of preferences may change. Instead of preferring more children they may choose the path of more per capita income. Although this will take time it may have in the long run a considerable effect on the size of the family. When people become more educated they may think about the appropriate balance between the satisfaction they might have from having more children and the costs of not having them. People through urbanization and education may feel more responsible towards their unborn children. Once they are to have the feeling that a new extra child means a new burden on the family budget, they may check the budget twice before the new child is to come.

So far we are in favour of the ~~re~~-investment criterion and we are motivated by the great need to enlarge the productive capacity of the economy by expanding the capital goods sector. This is because "if a backward country wishes quickly to attain a high rate of progress, what is necessary is not simply capital formation, but capital formation directed to the capital goods industries".⁽¹⁾

To the extent that this is true we would say that the re-investment criterion is the most suitable method of investment project selection and appraisal provided that the aim of economic policy is maximum increase in the rate of capital formation and growth over time. Consequently, investment projects should be selected according to the investible surplus to which they give rise as thus far mentioned.

As regards the limitations of this criterion we mention the following:-

1. See in this connexion, M.Abramowitz, "A Survey of Contemporary Economics", vol.ii, ed. Bernard F.Halley, American Economic Association, 1952, p.25.

- (1) The re-investment criterion sacrifices present gains which may be valuable to the society than future income.
- (2) This criterion does not take into account the import content of the project⁽¹⁾ in the sense that it does not distinguish between the cost of buying foreign goods and domestic goods.
- (3) Furthermore, the re-investment criterion though it accounts for welfare benefits neglects the social cost of the unemployed labour resulting from using labour-saving techniques.⁽²⁾
- (4) As it can be seen from the list of assumptions, the re-investment is fixed irrespective of the technique chosen. This assumption means that the technique which gives the maximum investible surplus per unit of capital investment will give the maximum rate of growth. That this is not valid can be proved if we compare situations where the owners of the factors of production have different propensities to consume.⁽³⁾
- (5) It is also necessary to point out that Profs. Galenson and Leibenstein have provided no theoretical reasons to justify their contention that the re-investment criterion should necessarily direct resources in a manner that would account for external economies and diseconomies.

1. See, A.K.Sen, op. cit.

2. See, Hans Neisser, 'Investment Criteria, Productivity and Economic Development', the Quarterly Journal of Economics, 1956, pp.644-648.

3. Compare A.K.Sen, op. cit.

(6) As mentioned earlier the re-investment criterion tries to maximize the ratio of capital to labour. There is however no limits to this policy. On this point Prof. H.S.Ellis has pointed out that "the ratio of capital to labour can always be raised by more capital, so that the term for the application of the re-investment criterion is indefinite".⁽¹⁾

6. Concluding Remarks.

In assessing the re-investment criterion I think we have to begin by asking what it is that we are trying to achieve? If, however, we are interested in maximizing the rate of growth of income per capita we have to maximize the rate of savings and hence the rate of investment in the economy. Investment in raising capital projects is only one of the other sources which the government may obtain the amount of capital required for future development. As Eckstein has pointed out, "Each government has certain policy weapons at its disposal by means of which it can influence the rate of growth. Resources can be released from consumption by means of taxation, monetary policy, price policies of state enterprises, foreign economic policy including borrowing, variations in the level of public services, and so on. If a government has very clear preferences about the rate of capital formation, it should select that combination of policies which will achieve that rate in the most painless way".⁽²⁾

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1. See, H.S.Ellis, "Accelerated Investment As a Force in Economic Development", the Quarterly Journal of Economics, vol.LXXII, 1958, p.485.
 2. See, Otto Eckstein, "Investment Criteria for Economic Development and the Theory of International Welfare Economics", in the Quarterly Journal of Economics, vol.LXXI, Feb., 1957, pp.56-85.

This however does not mean that investment in raising capital projects is not desirable. This is not what we intended to say, but the point is how to induce the private sector of the economy to apply the Galenson - Leibenstein criterion. How to keep them away from undertaking unproductive types of investment which may not increase productive capacity or average national productivity. Those who are said to have funds available for investment in these countries are usually motivated by preferences of quick but little-paying policies to slow but better paying ones. Furthermore, economic habits in these countries do not allow for the ventures of investment nor do they foster the spirit of economic initiative.

Providing the Schumpeterian entrepreneur in these countries, one may expect a rise of the growth rate of output through private enterprise activities. But under conditions of scarcity of entrepreneurship, it is hard to think about the possible applicability of the Galenson Leibenstein re-investment criterion in the private sphere without a co-ordinated comprehensive plan.

If, however, it is desirable to think in terms of re-investment policies, it is first and foremost, essential to create the type of the entrepreneur who scouts for new opportunities. A kind of professional promoter who withdraws when the new business is under way and starts another to which he applies his capital and both profits and experience acquired in his preceding promotional activities.⁽¹⁾

In the absence of such a growth agent the Government or one of its agencies has to be the prime mover. Governments usually have a wide range of instruments for influencing the investment decisions

1. See, A.A.I. El-Gritly, "The Structure of Modern Industry in Egypt", *L'Egypte Contemporaine*, November-December 1947, p.377.

of the private investors. It is only under Government direction that the re-investment criterion may be applicable provided that the aim of economic policy is maximum increase in the rate of per capita income growth over time.

CHAPTER V

THE TIME SERIES CRITERION AND THE CHOICE OF PRODUCTION TECHNIQUES⁽¹⁾

1. Introductory note.

The subject matter of this chapter is to shed some further light on the problem of the choice of capital intensity in development planning. The problem that we have started earlier while discussing the capital-output ratio rule and the marginal per capita reinvestment criterion. The criterion under review will enable the decision maker to handle the critical change-over points in investment choices as the time horizon of the planning authority varies. This however, is due to the introduction of what Dr. A.Sen has christened the "period of recovery". In what follows we shall discuss The Time Series Criterion as suggested and developed by Dr. A.Sen. Worth noting that the criterion under consideration rests on the assumption that it is to be applied by a planning authority for the choice of production techniques for the consumer goods sector only.

2. What does the time series criterion connote?

For clarification of what the time series criterion means, we may quote the author:

"When confronted with the choice between various techniques, we start by finding out our best guess of the time series of real income flows corresponding to each technique. This is done by applying the rate of reinvestment with corrections due to the variability of the

1. The main references to this criterion are:-

Amartya Kumar Sen, "Some Notes On The Choice of Capital-Intensity In Development Planning", in the Quarterly Journal of Economics, Vol.LXXI, No.4, Nov. 1957, and the same author on "Choice of Capital Intensity Further Considered" in the QJE, Vol.LXXIII, No.3, August, 1959.



volume of investment as we choose one technique rather than another. If $(\frac{r_1}{r_2})$ is the ratio of reinvestment with technique I and technique II respectively and if $(\frac{m_1}{m_2})$ is the ratio of the volumes of investment that could be undertaken when we choose the respective techniques, technique I will lead to a higher or lower rate of growth depending on whether $(m_1 r_1) > \text{or} < (m_2 r_2)$. This way the two time series of real income flows are obtained."¹

From the above quotation, it is apparent, that the choice of the technique depends upon its expected yield. The one achieving a higher rate of growth of real income is that which is to be preferable. If, for instance, in the above case, $(m_1 r_1)$ is greater than $(m_2 r_2)$; one would expect that technique I would yield a higher rate of growth of real income than technique II.²

Even if technique H, i.e. the capital-intensive technique, achieves a higher rate of growth of output than technique L, i.e. the less capital-intensive technique, this does not mean that the first technique is the final choice. A time discounting factor is necessary for at least two reasons:-

(a) the first is due to the diminishing marginal social utility of income as the level of income rises;³

(b) and, in the second place, for the uncertainty of the future.

If, however, it is correct to say that as income rises its social

1. See Dr. Sen first article, op. cit. p.568.
2. From now we shall refer to technique I as technique H., i.e. the more capital-intensive one, and to technique II as technique L, i.e. the more labour-intensive technique.
3. Dr. Sen assumes cardinality and interpersonal comparability of utility. Although he admits that this assumption is not quite correct, he contends the view that we have to value income less when we have more of it. See, op. cit. p.569.

utility at the margin declines, in such a case, a higher rate of growth of income in the future may be of less importance to the society since it might not give a higher rate of present satisfaction. Hence the application of a discounting time factor would affect the choice of capital intensity of the investment projects. Considering this facet of the problem of choice over time, our choice of investment projects under consideration may be to some extent more rational at least from a theoretical point of view.

In practice, it is hard to foresee what exactly is going to happen in the future. We are living in an uncertain world and even if we work out all the results of today's actions for all time to come, something may happen which changes our expectations concerning the benefits which is to accrue in the far distant future before the arrival of that future. Hence, if it is possible to account for that uncertain future we will be staying on a more solid ground. But how this could be achieved one is not yet certain. It ought however, to be remembered as Dr. Sen himself admits that, "the object of the exercise, one has to remember, is not perfection, but minimization of imperfection".¹ Having this in mind we will turn now to discuss the concept of the "period of recovery" as has been explored by Dr. Sen in his first article.

3. The period of recovery and the choice of production techniques over time.

The period of recovery is defined as "the period of time in which the total output (the sum of yearly flows) with the more capital intensive technique is just equal to that with the less intensive technique".²

1. See, Dr. Sen, op. cit., p.571.

2. See, ibid, p.569.

As we have already mentioned, the need to discount the time requires the measurement of both utility and uncertainty functions. As this seems to be of utmost difficulty, the application of the time series criterion to actual choices of capital intensity is not possible. To overcome such difficulties Dr. Sen has suggested a less satisfactory but more workable method for choosing the appropriate production method over time.

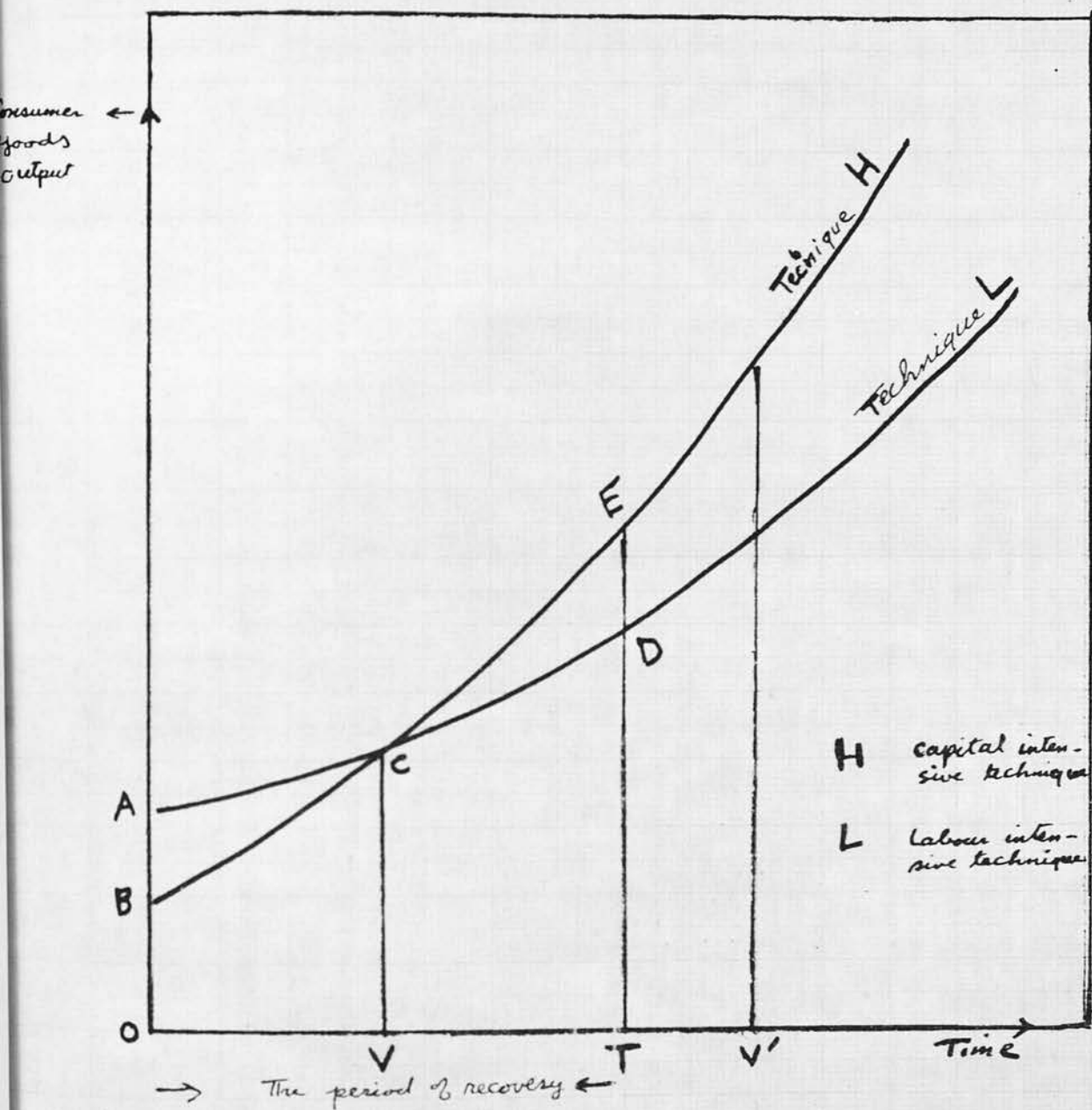
Accordingly, one has to fix the period of time he is going to take into account and see whether the loss of immediate output incurred by choosing the more capital intensive technique, i.e. H, is more than the benefit from it later on. All this before the period of consideration is over.

The accompanying diagrammatical illustration may be of help for further clarification to the concept under consideration.

In the diagrammatical illustration the vertical axis measures the income flows with the respective technique and the horizontal axis refers to the time. More precisely, the two curves in the diagram, i.e. H. and L give the two time series of consumption flows with the respective technique. Moreover, OT represents the period of recovery, as the surplus-area for the more capital-intensive technique (CDE) is exactly equal to its deficit area (CAB).

Now, if we choose a period other than that in which the total consumption flows with technique H is just equal to that with technique L, we can decide which of the techniques is preferable. If however, the period as given by the value judgment of the decision maker is V; the choice between the two techniques can be taken according to whether the period of time V is less, more or equal to the period of recovery. If V is less than T (in the previous diagram) the less capital intensive

The period of recovery*: Diagrammatical Illustration



* The period of recovery is the period of time over which the levels of aggregate real consumption are the same.

technique is preferable. When V is greater than T ; technique H , i.e. the more capital intensive, should be chosen. Finally, if V equals T , we are indifferent between the two techniques.*

The last point to be said is about the period of time V we have to assume. The choice of V determines not only the planner's objectives but also the criterion he has to use. If the planner object is to maximise output in a short time he has to assume $V = 1$ (the planning period). In this case he is interested in the first period only. Hence, the technique which gives the higher rate of immediate output is preferable. If this is the case, the time series criterion coincides with the earlier SMP criterion. This is simply because the policy objective underlying the social marginal productivity criterion is maximum output at the present.

On the other hand, if it is assumed that the planning period is infinity, i.e. $V = \infty$; the time series criterion coincides with the Galenson-Leibenstein re-investment criterion. The reason is because what we are interested in is not only the returns which might accrue in the first planning period, but in all those accruing in all time to come.

Obviously, the time series criterion is nothing more than a combination of the social marginal productivity rule and the marginal per capita reinvestment criterion. But it differs to the earlier criteria by introducing the possibility of intermediate time-horizon which is not accountable in the previously discussed investment rules.⁽¹⁾

* It seems to the writer that in this case it is desirable to choose technique H (the more labour intensive). This is because in this way we can increase both output and employment.

(1) See, D.M.Dosser, op. cit.

4. Theoretical Appraisal and concluding Remarks:-

To summarize: the nature of the time series criterion can be perceived in assuming two investment projects producing the same kind of output (consumption goods); but using different degrees of capital intensity. The project using highly capital intensive methods yields a lower return in the present but a higher growth rate of output in the future. The other project which uses less capital-intensive methods yields immediate output at the present. The final choice between the two projects depends upon the time horizon of the planning authority. If this time is short, the labour intensive project is the choice. If the time horizon is short, the labour intensive project is the choice. If the time horizon is very long, the capital-intensive project is to be selected. Again it is a question of objectives.

CHAPTER VI

THE MARGINAL GROWTH CONTRIBUTION

CRITERION (MGC)

Introductory note

The criterion under review contains various elements from the previous criteria. In particular, it draws from the work of Professors Robinson and Leibenstein. As we shall see, the marginal growth contribution criterion is a combination of the social marginal productivity and the marginal per capita investment criterion. The reason is simply because it does not only reflect the project's contribution to the consumer's welfare in the present but also improves on the idea of the "future investment potential" of the project.

CHAPTER VI

ON THE MARGINAL GROWTH

CONTRIBUTION CRITERION

(MGC)

In what follows, we shall discuss the "marginal growth contribution of the project" (MGC) as has been suggested by J. Robinson.⁽¹⁾ As a starting point we shall seek to indicate the reasons which justify for such a criterion, the assumptions underlying it, and the formula which illustrates its components and facilitates its empirical implementation.

We now need the marginal growth contribution criterion.

Needless to say that if per capita real income in less developed countries is to rise, more capital formation is needed than is currently taking place. As we have seen in the previous chapter the re-investment criterion concentrates heavily on this facet of the problem. The distribution of available funds for investment in less developed

1. See Otto Robinson, op. cit., pp. 56-55.

CHAPTER VI

THE MARGINAL GROWTH CONTRIBUTION

CRITERION (MGC)

1. Introductory note.

The criterion under review contains various elements from the previous criteria. In particular, it draws from the work of Professors Galenson and Leibenstein. As we shall see, the marginal growth contribution criterion is a combination of the social marginal productivity rule and the marginal per capita re-investment criterion. The reason is simply because it does not only reflect the project's contribution to the consumer's welfare in the present but also improves on the idea of the "future investment potential" of the project. Furthermore, it takes into account the role of the government tax policy.

In what follows, however, we shall discuss the "marginal growth contribution of the project criterion (MGC)" as has been suggested by O.Eckstein.⁽¹⁾ As a starting point we shall seek to indicate the reasons which call for such a criterion, the assumptions underlying it, and the formula which illustrates its components and facilitates its empirical implementation.

2. Why we need the marginal growth contribution criterion.

Needless to say that if per capita real income in less developed countries is to rise, more capital formation is needed than is currently taking place. As we have seen in the previous chapter the re-investment criterion concentrates heavily on this facet of the problem. The distribution of available funds for investment in less developed

1. See Otto Eckstein, op. cit., pp.56-85.

countries accordingly maximises future investment potential and hence future rate of growth of output. Through investing in raising-capital projects, the country may secure an increasing rate of potential savings over time.

Against this type of investment policy Eckstein has pointed out that it may be desirable to achieve the required rates of savings through employing fiscal-monetary devices than concentrating on policies designed especially to produce sufficient savings. Governments usually have various weapons by which it could increase savings. Through adopting voluntary and compulsory⁽¹⁾ methods savings can be mobilized.

Though Professor Eckstein holds this proposition he has pointed out that there are some cases in which the government may not be able to achieve a satisfactory rate of capital formation through fiscal and monetary devices. In this case, it is desirable to select investment types or projects that will promote the required rates of growth.

Following his argument, if we assume that the government rejects the capital market as a device for determining the rate of saving necessary to achieve a certain projected rate of growth and it (the government or its planning agency) wishes to impose on the community a rate of saving greater than that which can be achieved by other means, the government in this case will need some criterion other than the previously discussed one in the light of which investment projects are

1. Voluntary savings include mainly: personal savings, corporate savings, funds of life and other insurance offices or of pension schemes, funds of co-operative and mutual aid societies and voluntary subscriptions to public loans and savings schemes. The role of the government here is to adopt methods which stimulate the accumulation of these funds. In addition, the government can increase savings through the fiscal system. Compulsory savings usually take the form of taxation, profits of State trading and public enterprises, deficit financing, inflation and obligatory social security contributions.

to be selected. This criterion is what Professor Eckstein has called the marginal growth contribution of the project criterion.

According to Eckstein's criterion the best allocation of investment among projects is achieved by equating the marginal growth contribution made by capital investment in different directions. This criterion, however, is defined in such a way as to reflect the project's contribution to consumer's welfare in the present and the indirect contribution made possible by the generated addition to the capital stock.

3. The Marginal growth contribution criterion and its mathematical exposition as worked out by Prof. Otto Eckstein.

Following Prof. Eckstein we assume⁽¹⁾:-

- (1) A central planning authority having some control over the choice of development projects, wishes to maximise a social welfare function based on consumers' preferences. The required maximum is the difference between the present value of the future stream of goods available to households and the present value of the future stream of factor services.
- (2) The planning authority expresses the collective judgment about the value of the society's future income by means of an interest rate.
- (3) No other external economies and diseconomies than those which the planning authorities can account for.
- (4) All markets including the foreign exchange market but excluding the capital market function perfectly.
- (5) All firms maximise profits and operate under conditions of non-decreasing marginal cost.

1. See Otto Eckstein, op. cit., pp.66-70.

- (6) All households purchase consumer goods and supply factor services in accordance with their preferences and that their marginal rates of substitution are diminishing.
- (7) The planning authorities can predict future prices.
- (8) That the government or its planning agency is capable of maintaining optimal distribution of income over time through taxes and subsidies without affecting marginal investment choices.
- (9) that at the disposal of the planning authority a given amount of capital, let it be (\bar{K}) .
- (10) That the planning authority is confronted by a set of N investment opportunities and the objective is to choose the optimal project set maximising the objective function.
- (11) Each individual investment project has a production function relating its net contribution to real national income (as defined above) to the amount of capital which is to be invested in each project in order to produce that output.

The production function can be mathematically expressed as follows:-

$$Y_l = Y_l(K_l) \quad (1.1) \quad \text{where } (l = 1, \dots, N)$$

It is also assumed that the above function is to increase at a non-increasing rate.

- (12) Each of the projects has a re-investment coefficient (A_l) reflecting the share of the projects contribution to income that goes into savings. The value of this re-investment coefficient is a function of the following variables:-

- (i) the distribution of the projects factor payments, among groups having different propensities to save;
- (ii) on the government's capacity to tax these incomes and the projects output;

- (iii) the difference between annual depreciation and replacement expenses;
- (iv) in the case of socialist enterprises, the re-investment coefficient also depends on the government capacity to run these projects at a profit.
- (13) Economic lives of all projects are to be also taken into consideration. Here we shall refer to this as equal to T .
- (14) The criterion is also based on the assumption that the marginal productivity of capital is given and we shall refer to it here as equal to β .
- (15) It is also assumed that a part of the output of the investment projects under consideration which are to be financed out of re-investment will also become funds available for further investment and so on ad infinitum. A re-investment coefficient is assumed for these subsequent stages. We shall refer to it in this chapter as (A_R) .

Given the above assumptions the MGC criterion can be derived by maximizing the present value of the future consumption stream as follows:-

$$H = \sum_{t=1}^T \sum_{L=1}^n \frac{(1 - A_L)}{(1 + i)^t} + \sum_{t=1}^{\infty} \frac{(1 - A_R) Y_{Rt}}{(1 + i)^t}$$

subject to the production conditions

$$Y_L = Y_L(K_L), (L = 1, \dots, n), \text{ and}$$

$$Y_{Rt}^{(1)} = Y_{Rt}(K_{Rt}), (t = 1, \dots, \infty), \text{ where}$$

1. Y_{Rt} is the amount of capital which is to be made available in period (t) through previous re-investment.

$$\frac{\partial Y_{Rt}}{\partial K_{Rt}} = \beta$$

and subject to the capital constraint

$$\sum_{L=1}^n K_L \leq \bar{K}$$

After some mathematical work Professor Eckstein has simplified his formula for the MGC criterion into the following form:-

$$\begin{aligned} \text{MGC}^{(2)} = \frac{\partial Y_L}{\partial K_L} & \sum_{t=1}^T \frac{1 - a_L}{(1+i)^t} \\ & + \frac{\partial Y_L}{\partial K_L} a_L(1 - a_R) \left[\frac{(1+i)^T - 1}{i(1+i)^T - 1} \right] \frac{\beta}{1 - a_R \beta} \end{aligned}$$

The first term in this formula measures the projects direct contribution to output in the present period. The second term measures the contribution of the project to potential investment and hence it gives a measure of the present value of the future consumption stream which is to be made possible by the increased growth of capital through re-investing the surplus that is to emerge from the initial investment.

4. Theoretical appraisal and criticism:-

Given the assumptions upon which the MGC of the project criterion rests we would say that this criterion contains a lot of improvements upon the previous rules. Here, we have forecasted market prices and other centrally-determined prices. As an example of the latter is the rate of interest which is to be given by the planning authority and it expresses the collective judgment about the society's time preference.

The MGC criterion, however, is very sensitive to the interest rate. At low interest rate, the criterion chooses investment projects

having a high re-investment coefficient but higher immediate income will be the choice. The value of the MGC criterion becomes infinite if the rate of interest is less than the over-all growth rate of the economy.

As mentioned earlier, this criterion improves on the idea of potential savings. This is because each project yields income during its life. Some of this income is to be destined to savings for further re-investment. Hence the value of the project is influenced by the growth potential of the generated savings from the initial investment.

One of the merits of Eckstein's criterion is that it does not assume that all profits are to be saved and all wages are to be consumed as it was the case in the previously mentioned marginal per capita re-investment criterion. This is because each project has a re-investment coefficient, which depends upon the distribution of the project's factor payments among groups with different propensities to save, on the government capacity to tax these incomes, on the projects output and upon the degree to which the amount set aside for depreciation exceeds the annual replacement expenses.

Now, the question is: what are the limitations of the MGC criterion?

Eckstein himself has set two basic limitations for his criterion. First, he treats the population factor as an exogenous variable. As we have mentioned while we were discussing the marginal per capita re-investment criterion the choice of an investment project affects the future rate of growth of population and hence per capita income. It is therefore necessary to take the population factor into consideration. Had Professor Eckstein treated the population

factor as an endogenous variable in his criterion; the MGC criterion would have been more useful.

Second, Professor Eckstein assumes that throughout the growth of the system, income distribution is to remain in a satisfactory state by purely fiscal means. In less developed countries however where the fiscal system hardly performs its functions it is difficult to maintain equity standards in the distribution of income by purely fiscal means.

It is therefore necessary, if the MGC of the project criterion is to be the ruling factor in investment choices, to pay due consideration to the projects' income distribution effects. This is important because, as it can be inferred from the preceding analysis, the MGC criterion favours the choice of high profit-yielding projects having a high re-investment coefficient. But perhaps Prof. Eckstein is willing to sacrifice equity standards for the sake of maximum growth potential.

Now, what other factors which may belittle the type of investment policy dictated by the MGC criterion? Eckstein himself contends the view that savings might more efficiently be mobilized by a direct fiscal programme. This is because in this case we might avoid the selection of projects on savings-yielding basis "which do not put capital into the uses in which it is most productive".⁽¹⁾ Despite this, Eckstein's own investment criterion is based on the same ground he himself has already attacked. In defence of his criterion he has pointed out that there "may be circumstances in which a government finds itself unable to

1. See, Eckstein, op.cit.66

achieve a satisfactory rate of capital accumulation by purely fiscal means".⁽¹⁾

Although he does not clarify these circumstances one could mention the following reasons which may inhibit the tax system of the less developed countries to achieve a satisfactory rate of capital formation.

In the first place the reluctance of the people to pay taxes and the desire of the ruling regime not to device policies against the will of the people may make it difficult to realize the required savings for further investment.

Secondly, in these countries, it is difficult to administer the tax due to the shortage of tax administrators.

Thirdly, the difficulties connected with the assessment of taxes on special types of earnings such as agricultural profits due to the lack of proper accounting procedures.

Fourthly, the disincentives effects of all kinds of taxes may belittle the tax system as a savings mobilizer.

Fifthly, the existing low levels of income per head of population in these countries may delimit the tax revenue.

With regard to voluntary methods of mobilizing savings, it may be difficult in less developed countries to achieve a high rate of savings due to the lack of savings habits and savings institutions. It might also be difficult to realize savings through monetary policies without inflation.

The above factors inhibiting the mobilization of savings in less developed countries through fiscal-monetary policies may support the need for such a marginal growth contribution criterion.

1. Eckstein, op.cit., p.66.

The present writer however would assert the great need for a compromise of all such policies if it is desired to maintain an increasing supply of potential savings and hence potential investments in less developed countries. But it would be much better to rely on raising potential savings-investment policies than other policies which might have disincentive effects.

Now the point which confronts us is that which concerns prices. As we have already mentioned the marginal growth contribution criterion assumes that market prices are to be accurately forecasted. This however is not certain and problems of prediction are usually of utmost difficulty in less developed countries. Furthermore, in this criterion, the planning authority administers only the rate-of-interest, other prices are allowed to be determined in the market. As we have already mentioned in chapter one of this study, market prices are not a sufficient signalling device for future prices.

Moreover, this partial solution may not be the usual practice of all less developed countries. Less developed countries however, tend either to use market prices as they exist or general price-control.⁽¹⁾

5. Concluding Remarks:-

In conclusion, the marginal growth contribution criterion though it contains several improvements upon the earlier investment criteria; it is still market-oriented, based on highly simplified assumptions. Hence, the success of the investment policy that is to be based in the light of the marginal growth

1. D.Dosser, op.cit.

contribution criterion depends upon the ability of the decision maker to predict future prices accurately, assess the benefits arising from economic inter-dependencies, maintain an optimum distribution of income over time and to co-ordinate among other investment decisions.

1. Investment Criteria

There are two main criteria for investment: (1) the need for investment and (2) the availability of investment funds. The need for investment is determined by the rate of growth of the economy and the level of development. The availability of investment funds is determined by the level of savings and the level of foreign investment.

Also important in the process of investment is the selection of investment projects. This is done on the basis of the expected rate of return and the social benefits of the project.

CHAPTER VII

INVESTMENT CRITERIA: FURTHER ANALYSIS AND DATA NEEDED

Our task in this chapter is to analyze the investment criteria further and to determine the data needed for a more complete understanding of the investment process. We will first consider the need for investment and then the availability of investment funds. We will then discuss the selection of investment projects and the role of the government in investment.

The need for investment is determined by the rate of growth of the economy and the level of development. The rate of growth of the economy is determined by the level of investment and the level of savings. The level of development is determined by the level of investment and the level of savings.

The availability of investment funds is determined by the level of savings and the level of foreign investment. The level of savings is determined by the level of income and the level of consumption. The level of foreign investment is determined by the level of foreign savings and the level of foreign investment.

The selection of investment projects is done on the basis of the expected rate of return and the social benefits of the project. The expected rate of return is determined by the level of investment and the level of savings. The social benefits of the project are determined by the level of investment and the level of savings.

The role of the government in investment is to provide the necessary infrastructure and to provide the necessary capital. The government also provides the necessary legal framework for investment.

1. See, for example, the article, "Political Control of Political Economy," in *Journal of Political Economy*, Vol. 60, No. 1, 1952.
2. See, for example, the article, "The Strategy of Economic Development," in *Journal of Political Economy*, Vol. 60, No. 1, 1952.

CHAPTER VII

INVESTMENT CRITERIA: FURTHER ANALYSIS

AND DATA NEEDED

1. Introductory note.

There are two general and basic problems the Q.J.E. investment criteria discussion has less emphasised. These however are:-(1)

(i) the great need for, and difficulty of, co-ordination of investment decisions;

(ii) the great need for, and difficulty of, forecasting future demand.

Also important is the problem of investment timing or "efficient sequences" of investment decisions and the maximisation of "induced investment decisions".(2)

Our task in this chapter is to shed some light upon the above mentioned problems. Furthermore, we shall give a brief account of the statistical data needed.

2. Investment priorities, forward and backward linkages, and the Sequence of investment priorities.

To begin with, it is worth noting that Prof. A.O. Hirschman, has attached some of the previously examined investment rules for ignoring "efficient sequences" and the maximisation of "induced investment decisions". Following this line of thought we would say that since development is a cumulative process in

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1. See, D.Dosser 1962 article, Scottish Journal of Political Economy, op. cit. [41]
 2. See, A.O.Hirschman, The Strategy of Economic Development, op. cit.

time, the most important question in investment choices is: "Will expenditure on education or on transport in the next year (or period) stimulate the most investment in other fields in subsequent years?" This may be a better way to approach the problem of investment choices than putting the question in the form: "Will education or improved transport add more to national income during the next few years?"⁽¹⁾

While most of the rules thus far discussed in the preceding chapters concentrate on the latter question; the appropriate investment policy in the light of Hirschman's analysis is the one which takes into account the inducing role of the initial investment. It is therefore not surprising to mention that "the question of priority must be resolved on the basis of a comparative appraisal of the strength with which progress in one of these areas will induce progress in the other(s). In these basic types of development decisions, it is therefore not sufficient to supplement, qualify, and otherwise refine the usual investment criteria. We must evolve entirely new aids to thought and action in this largely uncharted territory of efficient sequences and optimal development strategies".⁽²⁾

Our interest in the previous statement lies on the new investment criterion it contains. As it is apparent from the above statement, industries are to be ranked according to their total linkage effects. Obviously, those with the highest total backward and forward linkage effects are those which have to be

1. See, B.Higgins, op. cit.

2. See, Albert O.Hirschman, op. cit., p.79.

undertaken first.

Though it may be difficult to discover these industries without making empirical studies of the "input-output" matrix variety one could mention Iron and Steel industries. Empirical evidence suggests that this industry ranks highly in terms of linkage effects. Table (7-1) which was originally prepared by Professors Watanabe and Chenery, reproduced by Hirschman⁽¹⁾ to illustrate his concept of linkages and also by Higgins⁽²⁾ to explain Hirschman's main ideas; provides the empirical evidence.⁽³⁾ The table that is based on the experience of other countries provides useful guides to development planners in assigning investment priorities for the now developing countries. Furthermore it sheds further light upon what is known in the literature as key industries such as Iron and Steel. It is however interesting to note, says Professor Hirschman, "that the industry with the highest combined linkage score is Iron and Steel. Perhaps the under developed countries are not so foolish and so exclusively prestige-motivated in attributing prime importance to this industry".⁽⁴⁾

It is not the object of this chapter to discuss the details of this investment policy outlined by Professor Hirschman. Suffice it is here to assert that planning authorities in determining the sequence of investment projects should pay great

1. See Hirschman, op. cit., pp.106-107.

2. See Higgins, op. cit., pp.406-407, table 16-1.

3. See Appendix (2) at the end of this chapter table (4).

4. See, Hirschman, p.108.

Table No.(7-1)

**Average Degree of Interdependence of Economic Sectors
in Italy, Japan and the United States.**

	Interdependence through purchases ⁺ from other sectors (backward linkage)	Interdependence through sales ⁺⁺ to other sectors (forward linkage)
1. "Intermediate manufacture" (backward and forward linkage both high):		
Iron and steel	66	78
Non-ferrous metals	61	81
Paper and products	57	78
Petroleum products	65	68
Coal products	63	67
Chemicals	60	69
Textiles	67	57
Rubber products	51	48
Printing and publishing	49	46
2. "Final Manufacture" (backward linkage high, forward linkage low):		
Grain mill products	89	42
Leather and products	66	37
Lumber and wood products	61	38
Apparel	69	12
Transport equipment	60	20
Machinery	51	28
Non-metallic mineral products	47	30
Processed foods	61	15
Shipbuilding	58	14
Miscellaneous industries	43	20
3. "Intermediate primary production" (forward linkage high, backward linkage low):		
Metal mining	21	93
Petroleum and natural gas	15	97
Coal mining	23	87
Agriculture and forestry	31	72
Electric power	27	59
Non-metallic minerals	17	52
4. "Final Primary production" (backward and forward linkage both low):		
Fishing	24	36
Transport	31	26
Services	19	34
Trade	16	17

⁺ Percentage ratio of interindustry purchases to total production.

⁺⁺ Percentage ratio of interindustry sales to total demand.

Source:- A.O.Hirschman, op.cit. p.106-107.

attention to those types of investment having a continuous expanding effect on the whole economy. In view of Professor Hirschman one can distinguish between two types of investment: "pressure-creating" and "pressure-relieving". While it is the function of the government to undertake the latter type, the first type of investment is to be left to the private sector. It is undoubtedly the government's function to provide the private sector by the necessary transport facilities, public utilities, education and other types of investment having a pressure-relieving effect. This induced role of the government will encourage further progress. As Hirschman himself maintains, "knowledge on the part of private operators that bottlenecks and shortages will be efficiently taken care of if and when they appear acts as a considerable spur to further development".⁽¹⁾

3. The need for integration and co-ordination of investment decisions.

The question of dovetailing public and private investment decisions is one of the most difficult problems in development planning. As mentioned earlier, the private interest may substantially differ than the social interest. Here there is a case where economic criteria of the kind discussed in the earlier chapters (e.g. the S.M.P. rule) may help the planning authorities to give specific content to the concept of private economic value as distinct from social economic value.

A comparison of a basket of private investment projects selected according to the private profit rule with a basket of projects resulting from use of the S.M.P. criterion would

1. See, A.O.Hirschman, The Strategy of Economic Development, op. cit.

indicate the amount of subsidies and taxes which may be justifiable to assure a coincidence between the over-all interest and private individual interests.

Still another problem concerning, the internal consistency of the public investment programme itself we have not yet discussed. This problem of co-ordination of investment decisions concerning various parts of the plan is very difficult and in the same time very important for less developed countries due to the initial lack of interdependence between sectors (before development).⁽¹⁾ The difficulty of the problem arises from the fact that in less developed countries, the supplying sectors, whose output will be used as inputs in the new investment project, may not exist. Therefore both of the inter-related investment projects have to be established. This situation may not exist in the more advanced countries where the development of a new investment project in isolation can rely on the ability of the existing supplying sectors to provide the additional producer goods.

It is therefore necessary to pay due consideration to the question of co-ordination in plan formulation. Although some of the investment rules previously discussed have recognised this facet of the problem, the investment criteria discussion did not provide a concrete answer. For a better solution of the problem

1. For the empirical evidence see the input-output table of Tanganyika prepared by Professor A.T. Peacock and D.G.M. Dosser, National Income of Tanganyika (H.M.S.O.) 1958. See also their article in the Review of Economic Studies, 1957, op. cit.

an over-all programming approach is necessary. This is because the theory of programming inter-dependent activities deals with many problems the most important of which is the co-ordination of various sets of inter-dependent decisions that must be brought into agreement for the realisation of the programmes under consideration. Furthermore, it provides the decision maker with an optimum set of alternative activities. His task then is to select what is to be considered the best out of all the possible programmes.⁽¹⁾

We have left the most important and difficult question to the last. The question of forecasting future demand in less developed countries raises further problems. The major problem in this respect stems from the need for an ex-ante rather than an ex-post measurement of the project economic returns. To quantify the anticipated return, one should predict the quantities to be produced and their future prices.

This however, is by no means an easy task: The difficulty however, arises from uncontrollable factors such as climatic conditions. Because of this reason among others it may be difficult to forecast accurately the quantities to be produced especially in primary producing countries where agricultural output depends on the amount of rainfall in the growing season

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1. For further details on the theory of programming and the question of the internal consistency of development programmes see, Oscar Lange, Introduction to Econometrics (Pergamon Press, London, 1959). Ch.III pp.206-347.

such as Libya and Syria.⁽¹⁾

Historical data, as it can be seen from table (7-2) shows that the value of agricultural production of cereals in Syria has fallen by about 60 per cent in one year. (Compare 1957 with 1958). The fluctuations in the total value of agricultural production is mostly due to the variations in the quantity produced because of the mutable weather conditions.

There is yet the problem of uncertainty arising from the need to assess the returns of the investment projects in value terms where the product is a good for export. It may prove difficult to forecast price and income elasticities in the world market.

The problem is more acute in primary product producing countries. The price of export products is in most cases exogeneously-determined. Fluctuations in export proceeds in value terms is therefore inevitable. Past experience supports this point of view. (Table (7-3) statistically illustrates the volatility in Egypt's exports of cotton. The upshot of the above discussion is that the estimates of future returns in terms of quantities to be produced and in value terms are likely to carry a high error probability due to both meteorological and external disturbances in less developed countries.⁽²⁾ There

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1. Syria depends heavily on rain. Her cultivable area is estimated to be 6 million hectares. Of this total about 4.1 million ha. are used for dry farming. Agricultural production despite this contributes 40% of Syria national income. Among the basic objectives of economic planning in the U.A.R. as we shall see later on is to make the Syrian economy less dependent on weather conditions through the building-up of irrigation projects.
 2. See in this connection, D.Dosser previously mentioned article, op. cit. [41.]

Table No.(7-2)

Value of Vegetable Production in the Syrian Region
of the U.A.R. (at factor cost).
(1952-1958)

(in million L.S.)

	1952	1953	1954	1955	1956	1957	1958
Cereals ⁽¹⁾	488	395	351	169	417	445	184
Dry legumes ⁽²⁾	49	48	37	21	42	48	29
Vegetables ⁽³⁾	48	43	35	31	45	51	34
Industrial crops ⁽⁴⁾	221	143	227	197	216	259	193
Other agricultural production ⁽⁵⁾	172	191	173	129	186	187	173
Total	978	820	823	547	906	990	613

Source:- Compiled from: National Income Estimates, Series No. 1/1958 and 1/1959, Ministry of Planning, Directorate of Statistics, Damascus, Syrian Region, U.A.R.

- (1) Cereals include the production of the following crops: Wheat, Barley, Maize, Rice, Millet, Oats.
- (2) Dry Legumes consists of: Lentils, Chick-peas, Peas, Rambling Vetch, Broad Beans, Haricot beans, Bitter Vetch and Flowering
- (3) Vegetables include: Potatoes, Garlic, Tomatoes, Onions, Egg-plant and Onion Sets.
- (4) Industrial crops comprise: Cotton, Sesame, Sugar Cane, Tobacco, Tombac, Linseed, Hemp and Sugar-Beet.
- (5) Other agricultural production includes: Fruit trees production (i.e., Olives, grapes, apricots, apples, pears, plums, peaches, nuts, pomegranates, figs, almonds, cherries, quince, pistachio of Aleppo), and other gardening crops.

Table No.(7-3)

Egypt Export Cotton Price Index*

(1953 = 100)

	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959
All cotton varieties price index	115	192	139	100	117	115	125	140	116	103
Menoufi price index	-	-	120	100	117	122	145	151	121	107
Giza 30 price index	126	179	125	100	114	107	115	120	112	93
Ashmouni price index	114	186	134	100	119	109	120	133	120	116
Karuak price index	111	194	162	100	111	117	129	146	119	92

*Source:- Compiled from International Monetary Fund: International Financial Statistics, Vol.XIII, 1960.

also appears to be yet the problem of uncertainty in those areas of economic decision-making where the time factor is a significant and important element in differentiating alternatives.

Technology for instance as well as preferences and institutions may change over time. No less significant, as mentioned elsewhere in this study, is the question: To what extent are present and projected prices, where they exist, valid and relevant indicators for evaluating the impact of developmental investment projects.

The discussion so far was mainly concerned with the difficulties involved in giving a quantitative precision to the theoretical investment criteria discussed in the preceeding chapters. In the next section we shall discuss some of the data needed for development planning in general and for investment project analysis in particular.

4. Data needed.

It is not the purpose of this section to explore the unsatisfactory state of much of the basic statistical information needed for the formulation of development plans in less developed countries. Nor to indicate the main reasons for the weaknesses of the present state of statistical knowledge. Suffice, however, to assert the need for further improvements through systematic research. In what follows however we shall give a brief list by the kind of statistical data needed for plan preparation in general and investment project analysis in particular. Some of the data are merely technical, others are of a psycho-sociological nature. The rest is a mixture of

the two.⁽¹⁾

More generally, data concerning output, income, employment, price elasticities of demand, labour productivity, capital coefficients are required. Following the above mentioned classification of the type of data we proceed as follows:-

(a) Technological data.

The knowledge of technical coefficients are of utmost concern to the development planner. Without the availability of capital-output ratios, both for the economy as a whole and for each sector and individual industry within the economy, the decision-maker may not be able to know by how much investment should increase to achieve a given target increase in per capita income and how much capital requirements are to vary with the composition of the development programme. We have already discussed the problems of measurement connected with this concept. Such problems however can be solved through accumulation of data over time.

Equally important to the development planner is the availability of capital-labour ratios. The knowledge of such coefficients would permit him to know how much capital investment is needed to put a given number of the labour force to work and how this amount of investment varies with the composition of the development programme.

All-in-all, the availability of such data will not only help the development planner to assess capital requirements for given targets of employment and income but also it provides him

1. See, Higgins, op. cit., pp.769-774.

with an index for the choice of the type of technology for the production of alternative commodities. Furthermore, the availability of technical coefficients might be of great use in international comparisons providing that there is no substantial differences in the methods adopted in each country in deriving a numerical value to capital-output and capital-job ratios.

Among the other technological data are those concerning factor-proportions, rates of substitution and production functions. Without such knowledge it may be difficult to choose between production methods. The present writer would suggest that in each country a research centre should be established to deal with such problems. The kind of "pilot-plant" research studies that are now carried out by the Netherlands Economics Institute is an example of the kind of research work that is to be made available in countries which are now developing. Once these studies are undertaken, it might be easier for the decision maker to adapt production methods to the factor endowments of the country under consideration without any loss of efficiency.

Closely related to the question of investment choices is the decision on the size and location of investment projects. Small scale projects or large scale; rural or urban; projects requiring a high capital ratio or labour-intensive projects. The decision on such matters requires further information. Such information can be obtained from countries that have already had the experience. The availability of such information would permit the decision-maker whether the government or the private investor to have at least an approximate idea about what would be

the potential increase in output per man-year with small-scale labour-intensive agriculture project and with large-scale capital-intensive industrial project. Furthermore, the accumulation of detailed information about agricultural projects would be of help to those prospective investors who are in favour of the vertical expansion of agriculture. With the help of this stock of knowledge, they can know in advance the main line of advance. That is to say they can know what can be expected from, for instance, improved techniques, seed selection, improvement of livestock strains and the betterment of agricultural irrigation methods.

So much for technological data. Let us now discuss the second group of information which we think is also important.

(b) Psycho-sociological data.

The most important information under this heading is that concerning the demographic factor. This is to say what makes people limit the size of their families and what are the institutional arrangements that would be conducive to this decision. And to what extent they are willing to accept birth-control devices? The collection of such information and the like concerning motivation and economic behaviour will be of great help to those who are responsible for the formulation of development plans.

(c) Mixed data.

The kind of data required for development policies that can be placed under this heading are those which relate to constellations of economic data, psycho-sociological, and

technological data. The most important of such data are input-output matrices linkages and model sequences. The use of the first set of data is for forecasting purposes. The second set of data is to trace inducement mechanisms.

But if input-output matrices are to be used as a forecasting device in the preparation of development plans, both the following questions must be asked. Will the pattern of technological relationships remain the same when output is doubled? Will the pattern of demand remain the same when income is doubled?

True it is a complicated problem. Through the growth of the economic system both the pattern of demand and the technical coefficients are subject to change through the development process.

In conclusion, we strongly recommend the accumulation of such knowledge through further studies of empirical nature. The accumulation of such knowledge can be facilitated if development agencies, whether in less developed countries or in those which are more advanced, maintain adequate records and make them available to those who are interested from other countries.

CHAPTER VIII
TENTATIVE CONCLUSIONS BASED
ON THE QJE INVESTMENT
CRITERIA DISCUSSION

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Despite the obvious defects of the previously discussed investment rules, one can distinguish two general approaches to investment policies in less developed countries. The social marginal product approach and the capital-intensive or the Key-sector approach. While the first approach is derived from the neo-classical principles of economics; the latter approach stems from the requirements of growth theory.

If however, the overriding policy objective is maximum increase in the aggregate level of output at the fastest possible pace, capital funds available for investment should be allocated in a way as to equate the social marginal product in every use. The ranking of investment projects has to be guided by the SMP method of assigning priorities. Those investment projects with the highest social return will be the choice.

On the other hand, if the society's aim is maximum increase in the rate of growth of output per capita not in the present; but in the future, the SMP method might not be the appropriate allocational device. The important factor in this case is not only the investment project productivity but also its potential savings (for reinvestment) capacity. Consequently, investment projects should be chosen according to the investible surplus to which they give rise. The ruling criterion in this case should be one of

the re-investment type criteria.⁽¹⁾

Hence, the choice of the investment method depends, first and foremost, on the policy objective one has to achieve. Once we are clear about what we are trying to achieve whether in the short-run or in the long-run; investment decisions are likely to be more rational and the conflict between the criteria of investment choices may be reconciled.

Having said this we shall turn now to indicate whether there is a real conflict between the social marginal product approach, and the re-investment approach, or it is merely a choice of ends and not a substantial conflict between the means that have proposed to achieve these ends. To put the question in another way: Is there any conflict between the welfare criterion and the rate of growth criterion? And if the answer is positive is it not possible to make a compromise?

A review of the existing literature shows that the answer to the above question is by no means positive. The distribution of investment according to the SMP method or in accord with one of the re-investment type rules would lead to the same result under the same set of assumptions.

Those who are against the social marginal product approach argue that if the distribution of investment is to be made in accordance with this rule, the less developed country might not develop its strategic economic sectors and accelerate its future rate of economic growth through further potential savings, invest-

1. Such as the Galenson-Leibenstein marginal per-capita re-investment criterion or Ecksteins' marginal growth contribution criterion.

ment and reinvestment. This however is not a correct interpretation of the SMP rule. Indeed, it is true that the rule favours the choice of investment projects having high immediate social return against those yielding low return in the present but high yield later on. It may also be true to say that the SMP rule favours the distribution of income widely (i.e. more wages to workers and less profits to the producing-units) than the capital-intensive approach.

It has been also argued that the maximisation of aggregate output is not in itself a sufficient condition for progress in countries where the population are increasing rapidly. Hence, the objective policy must be stated in terms of output increments per head of population. We have seen, however, while discussing the main investment rules, different objective criteria. For instance, while the policy objective the SMP rule is trying to achieve is maximum increase in immediate output; the marginal per capita reinvestment criterion its objective is maximum rate of potential savings and hence great increases in the potential rate of growth of output and employment per capita. If this is the case, it is not easy to decide on what would be the most suitable method for the allocation of scarce capital resources in less developed countries without being very clear about what we are trying to achieve. We will leave the question of objective criteria to be solved not by the economist and turn to discuss the point that we have previously mentioned with regard to the conflict between the means that have been suggested to achieve a certain fixed target criteria, the government or its planning authority wants to see reflected in the priority system.

If however, it is argued that the social marginal productivity approach is incompatible for the choice of investment projects having a high yield in the far distant future, one might argue that this might not be the case if one, for instance, attaches a relatively high present value to future returns by using a shadow rate of discount considerably below the market rate of interest. In this case, the investment project that yields low returns in the present but high returns in the future will rank highly in terms of marginal criteria. Again, if it is argued, that the distribution of capital investment in accord with the SMP rule, might favour the choice of labour intensive projects one can argue that the SMP rule does not necessarily imply this choice. Through the use of accounting prices^s, the set of investment projects that are highly desirable from a social point of view can be selected. With this accounting procedure, the less developed country can develop its industrial base and build up its social overhead capital. What however we would like to assert is that the social marginal productivity approach to investment policies in developing countries is not incompatible with the development of strategic growing points or "key sectors" in these countries which are eager to advance rapidly.

With regard to the question of potential savings for further growth, it has been argued that under the capital-intensive approach, more of the returns that are to emerge from the initial investment can be saved than what can be realised under the SMP method of assigning priorities. This is because under the first approach, it will not be necessary to distribute so much income to labour as the case might be under the SMP rule. Furthermore, under the

capital-intensive approach, it might be easier to restrict consumption more effectively than under the other approach. Under the re-investment approach, savings for further reinvestment can be increased from within. The ultimate result of this policy, one has to remember, is a higher rate of growth of output and employment over time.

Against the above argument one might raise the possibility of increasing national savings for further investment even if the existing capital is to be allocated according to the social marginal product rule. This is because out of the income that is to emerge from the initial investment more can be devoted for further investment. This might be the case if the government through its various weapons aimed at expanding the national propensity to save. Hence, if the government adopt measures that would raise the national propensity to save, the allocation of investment whether according to the social marginal product method or in the light of one of the re-investment type criteria might achieve the same result.

In conclusion, we think that there is no real contradiction between the capital-intensive approach and the social marginal productivity approach, provided that the government can control consumption if the SMP method is adopted.

What the former approach is saying is: if the policy objective is a rapid rate of per capita income growth over time, investment projects should be chosen according to one of the re-investment type criteria. On the other hand, if the policy objective is maximum immediate output investment projects should be selected according to the social marginal product method of allocation.

This is no more contradiction than saying to a prospective traveller:

If you wish to reach your destination quickly, go by air. If you wish to enjoy your journey, go by sea. Hence, it is a choice of ends not a conflict in the means achieving these ends.

PART TWO

INVESTMENT PRIORITIES:

Exposition, criticism
and theoretical appraisal

INTRODUCTION TO PART II

Thus far we have critically examined the main investment rules that have been suggested and developed by economists of repute in the QJE. In this part we shall proceed to shed some critical light upon some of the methods that have been recently suggested by National Planning Institutes as formal priority systems.

Chapter IX examines critically the Philippines investment priority system as originally established by the Philippines National Economic Council.

Chapter X examines an over-all economic priority model in which the choice of the investment programme is based on a comparison of alternative development patterns of the economy. As it can be seen from the contents of Chapter X, this method first considers the development of the economy without the investment programme. Second, it considers the development of the economy with a programme of investment projects. The influence of the investment programme on the whole economy is measured, by the total contribution of the investment programme to the future discounted income. This is determined by the difference between the future discounted national income with and without the investment programme. For this reason we shall call this method the with and without investment priority model.

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CHAPTER IX
ON THE PHILIPPINES INVESTMENT
PRIORITY SYSTEM⁽¹⁾

1. Introductory note.

The Philippines Republic is an underdeveloped economy with about 24 million people. Generally, the economy is complicated by the concept of "technological dualism". On the one hand, there is an industrial sector technologically advanced and highly productive. On the other there is the agricultural sector which is technologically backward and low in productivity. The basic economic problems of the economy are unemployment, balance of payment difficulties, maldistribution of income and dependence on a few exports the most important of which is coconut.

In 1957, the Philippines has formally launched its first Five Year Plan in order to achieve certain fixed targets. The general objective "is not to accelerate the rate of increase in the national income, but to sustain it in the face of increasing difficulties as the period of reconstruction recedes into the past, to distribute the fruits of economic growth more widely, and to translate the increase in national income into decreasing unemployment".⁽²⁾

Recently, the Philippines Planning Council has established an elaborate priority system with weights assigned to each factor used. Our task in this chapter is to examine critically this system of

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1. For a detailed discussion of the method under consideration see, Higgins, op. cit., pp.58-67, pp.653-686 and pp.741-749. See also, Philippines National Economic Council, The Five-Year Economic and Social Development Programme for Fiscal Years 1957-1961 (Manila).
 2. See Higgins, op. cit., p.744 and p.654.

priorities. Before coming to this it may be useful to mention that the priority system is designed to achieve the following objectives:-

- (1) To direct resources toward the most productive use;
- (2) to reduce unemployment;
- (3) to promote economic growth;
- (4) to improve the distribution of real income; and
- (5) to conserve foreign exchange.

2. The Priority System and its exposition as worked out by the Philippines National Economic Council.

To begin with let us consider the main guiding principles of the priority system. These, however, are:-

- (1) Other considerations being equal, preferences will be given to an industrial project that will make per unit of scarce resource expended (foreign exchange and capital) the highest contribution to the national income. The contribution of the investment project to national income is measured by the earnings of the productive factors including those of labour, land, capital and entrepreneur.
- (2) Other considerations being equal, preference will be given to an industrial project that will give per unit of scarce resource expended the highest measure of improvement in the country's balance of payments. This is measured by the annual foreign exchange value of the product minus the value of foreign exchange used in production per unit of investment.

- (3) Other considerations being equal, preference will be given to an investment project that will make the greater use of domestic raw materials.
- (4) Other considerations being equal, preference will be given to an investment project that will make the most use of domestic labour. This is represented in the formula by the annual value of such labour per unit of scarce resource expended.
- (5) Other considerations being equal, preference will be given to an investment project that will produce goods that meet the more basic needs of the people and to investment projects that will produce the greater effect on external economies.

The investment priority formula as suggested by the Philippines National Economic Council is as follows:-

$$IP = R_1 + R_2 + R_3 + R_4$$

where:

IP = the investment priority formula

R_1 = the value added to national income by the factors of production involved in the project (including labour, land, capital and entrepreneur), as corrected by "an essentiality multiplier"⁽¹⁾ accounting for the impact of the project on external economies and for

1. The essentiality multiplier is a subjective concept. It reflects the value judgment of the decision maker. Among the factors considered in determining the weights are:- (i) the economic importance of the final product of the investment project whether as a commodity for export or domestic use; (ii) the source of raw materials and other supplies used; (iii) the source of capital equipment used, and (iv) the source of nationality of financing. Compare Check Sheet A for essentiality rating, table No.(9-1).

other social benefit considerations; the whole per unit of capital resources utilized (i.e. capital and foreign exchange).

$$= \frac{e(w + r + i + p)}{K}$$

where:

- e = the essentiality factor;
- w = compensation of all officials, employees, and labourers, including salaries, wages, bonuses, commissions, and others;
- r = rent for the use of land, building and other facilities;
- i = the interest rate paid for borrowed capital;
- p = profits on paid-up capital;
- K = total investment in the project (fixed assets plus circulating capital);
- R_2 = the balance of payment effect
- = $\frac{F.E.s/e - F.E.c.}{K}$

where:

- F.E.s/e = foreign exchange earned or saved;
- F.E.c. = actual foreign exchange cost incurred in production including all expenses on imported raw materials and supplies, salaries of foreign personnel, remittances, interest payments, amortization of value of assets acquired with foreign exchange, royalty payments, business trip abroad, technical and consulting services and all other foreign exchange outlays;
- K = as mentioned above.

R_3 = Social benefit derived from the use of domestic raw materials and supplies;

$$= d. \frac{rmd}{rmt} / K$$

where:

d = a coefficient for measuring the extra economic value generated from the utilization of domestic materials;

K = as mentioned before;

R_4 = the social value derived from the employment of labour;

$$= \frac{Ld. W}{K}$$

where:

Ld = number of paid workers (officials, employees and labourers);

W = a uniform average annual wage to be used in determining the social value arising from employing labour.⁽¹⁾

3. Theoretical appraisal and criticism.

Having reviewed the priority formula we shall now turn to its theoretical appraisal. To begin with let us recall the main purpose of the formula under consideration. Obvious it is to select out of the currently available alternatives the best project set for any current period. To achieve this a benefits-cost ratio is to be computed for each individual project. In view of the previous formula, costs were estimated in terms of capital resources which are scarce. Capital and foreign exchange were only considered as the most scarce factors and the formula was designed to secure their best allocation.

1. For further details see, Higgins, op. cit.

But one might argue that capital and foreign exchange are not only the factors which are scarce or in less developed countries. Skilled labour, managers, technicians and entrepreneurship are also scarce. Hence, in considering the allocation of scarce resources, the human factor should by no means be overlooked and the Philippines formula should be modified to take this aspect into consideration.

So much for the cost side of the Philippines investment priority formula. As regards the benefits arising from the development project this system provides only a measure for the direct benefits. Indirect benefits including the intangibles are not included. A rational priority system should take into account all the benefits beyond and behind the project.

Despite the above mentioned weaknesses, the Philippines formal priority system has its own logic. Two merits of the formula can be mentioned. First, the original motivations of the formula is to assure co-ordinated treatment by government agencies of requests for foreign exchange, tax and transfer privileges, intermediate and long-term loans. Secondly, it speeds decisions and removes personal influence.

Furthermore, the system is not limited to a special sector. But it is equally applicable to the private sector and to the public sector provided that there is a sufficient degree of control.

Now what is new in this method. This can be seen from the concept of "the essentiality multiplier" which we have not met in the previous methods. The idea has been introduced in the Philippines priority formula to provide an approximate measure of the impact of the investment project on external economies and on the distribution of real income.

With regard to external economies, higher ratings were given to essential producers' goods in primary industry than to essential producers' goods in secondary industry, and so on. The multiplier system was based on the assumption that the production of goods with higher priority ratings will have a higher effect on the total production of goods with lower priority ratings. This assumption however may be valid for the Philippines economy. This is because most of the industries which were recently established in the Philippines "to put finishing touches on imported semi-finished goods have done little to stimulate expansion in other sectors of the economy".⁽¹⁾ Hence given higher ratings to essential producers' goods might have a favourable effect on the rest of the economy.

But if we follow Hirschman's analysis of the concept of "backward linkages", the multiplier ratings should be modified. This is because the appearance of "backward linkages" due to the availability of labour and managerial skills, might induce the Filipino enterprises to undertake earlier stages of production. Furthermore, Hirschman's analysis would also suggest that higher "multipliers" should be given to enterprises in the middle of the chain of production than to those at the beginning.

All-in-all the Philippines priority formula provides, only an approximation to external economies and the only way to improve on it is to improve the measurement of external economies.

The essentiality multiplier was also used to influence the distribution of real income. This however was done by assigning

1. See Higgins, op. cit., p.660.

higher ratings to essential consumers' goods⁽¹⁾ than semiessential consumers' goods, semi-essential consumers' goods ranked higher than non-essential consumers' goods and so on. The priority system was designed in a way as to encourage the production of goods consumed by the low-income groups than the production of consumers' goods consumed by high income groups of the Philippines society.

With regard to prices that have been used in the evaluation both market and non-market factors have been considered. The value added concept, for instance, is a pure market factor as far as current market prices are used. As we have already pointed out current investment by changing both productive capacity and employment will exercise an important influence upon the future structure of prices. Hence the existing structure of market prices cannot be taken as a sure basis for forecasting what the future structure, and hence the return on any investment project will be. "Shadow prices" were used only in the case of domestic materials and domestic labour.

Two other problems the Philippines priority formula has completely overlooked. The first concerns the proper timing of investment planning; the other concerns the influence of the investment project on the national rate of savings.

With regard to the problem of investment timing the Philippines method in its present form is not appropriate for the choice of the optimal date, as among current and various future periods. The best project set can only be determined after the elimination of other investment projects which would better be undertaken in future periods.

1. Any consumers' goods was considered as essential whenever it plays an important role in the worker-peasant family budget.

Furthermore, an investment project though it seems to be attractive at the present, it might be more attractive at a later date. For a better solution for the pattern of timing in the initiation of investment projects an over-all macro dynamic model is needed.

With regard to the second point, the Philippines method tries only to reflect the impact of each investment project on the future development of the economy without taking into consideration the potential saving of the project. On this aspect of the problem, the Philippines priority method is inferior than the previously discussed investment rules especially those of the re-investment type, i.e. the marginal per capita re-investment criterion and the marginal growth contribution criterion.

4. Concluding remarks.

In conclusion the present method might be of use to the development planner in other countries similar in economic conditions to the Philippines economy to select out of currently available investment alternative the best set project of, for any current period but hardly more. To improve on it is to improve the measurement of external economies and the factors determining the "essentiality multiplier". With the existing body of statistics which is now available to the planning authorities, the Philippines priority formula may be operable.

Table (9-1)

Check Sheet A for Essentiality Rating (e)

Criterion	Points allowed				
	2.5	2.6	1.5	1.0	0.5
1A. Economic of <u>Export</u> product	Product to be largely exported in finished form	Product to be partly exported in semi-finished form	Product to be largely exported in semifinished form	Product to be partly exported in semiprocessed form and partly in raw form	Product to be largely exported in raw form
1B. Economic Importance of the <u>Domestic</u> Product	Product largely for use by other industries	Products partly for other industries and partly for consumption	products largely for basic human needs	Products partly for basic and partly for less basic human needs	Products largely luxurious or unessential
2. Materials and supplies used	Materials largely from domestic sources	Materials partly imported and partly in domestic raw form or largely imported in raw or semifinished form but their early availability from domestic sources is fairly certain	Materials partly imported and partly domestic in raw and semifinished form	Materials largely imported in raw and semifinished form	Materials largely imported in finished and semifinished form

Table (9-1) Continued

Points allowed					
Criterion					
	2.5	2.6	1.5	1.0	0.5
3. Capital equipment	Uses capital equipment entirely fabricated locally	Uses capital equipment largely fabricated locally	Uses capital equipment partly imported and partly locally fabricated	Uses capital equipment with very little local fabrication	Uses capital equipment entirely imported
4. Source of financing	Financed entirely by nationals, with paid-up capital more than 50% of total investment required	Financed entirely by nationals with paid-up capital less than 50% of total investment	Financed largely by nationals and partly by foreigners and/or aliens, or with foreign loans	Financed partly by nationals and largely by foreigners and/or aliens, and/or with foreign loans	Financed entirely by foreigners and/or aliens

Source: Philippines National Economic Council, The Five-Year Economic and Social Development Programme for Fiscal Years, 1957-1961 (Manila, 1957). p.217.

CHAPTER X

THE "KING AND TINBERGEN" PRIORITY CRITERION

1. Introduction

Despite the fact that the previous authors agree in their belief in rejection of the private profitability criterion as a basis for allocating the best investment projects; they do not agree on a single alternative. Furthermore they do not help in solving the development of such national issues for all future periods as the subject of the present programme. In this chapter the authors propose a new method of selection that might be used as a basis for future work. It is based on the earlier work of King and Tinbergen. We shall refer to it as the "King-Tinbergen" priority criterion model.

CHAPTER X

ON THE KING-TINBERGEN

INVESTMENT APPRAISAL

METHOD

The authors have followed a similar pattern and the operation of the method is as follows:

1. The authors have not only the direct influence of investments (e.g., the direct contribution to production) but also the indirect influence (e.g., the indirect effects on the economy).

2. The authors have followed a similar pattern and the operation of the method is as follows:

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CHAPTER X

THE "WITH AND WITHOUT" PRIORITY CRITERION

1. Introductory note.

Despite the fact that the previous methods agree in their implicit rejection of the private profitability criterion as a guide for selecting the best investment projects set; they do not offer a clear-cut alternative. Furthermore they do not help in comparing the development of real national income for all future periods with and without the investment programme. In this chapter, it is hoped to discuss the kind of method that might achieve this purpose. As this method is based on the earlier work of Professor Jan Tinbergen and Benjamin King, we shall refer to it henceforth as the Tinbergen-King "priority criteria model".¹

To avoid confusion with the aforementioned investment criteria, we distinguish the present method by what follows:-

First; it is macro and dynamic.

Second; it differentiates between gestation period and the operation period for every aspect of an investment project.²

Third; it includes not only the direct influences of investments (e.g. immediate contribution to production) but also the indirect influences (e.g. all other effects on the economy).

1. The method under consideration owes its origin to Benjamin B.King, economist at the International Bank for Reconstruction and Development. For a first discussion to its main principles see J.Tinbergen, Economic Policy: Principles and Design, Amsterdam, 1956, pp.178-185. For a further elaboration, see The Netherland Economic Institute progress report: The Appraisal of Investment Projects, March, 1958. See also, B.Higgins, Economic Development, op. cit., pp.663-666.

2. The construction or gestation period is the period "during which the investment project is being carried out". The operational period is "the period when the investment is completed and the newly created productive capacity is in operation". See The Netherland Economic Institute Progress Report, op. cit., p.3.

Fourth; it takes into account not only the investment projects influence on the future development of the economy (through their direct increase of the production capacity) but also the project influences on the national saving rate.

Fifth; this method uses accounting prices and discounts for national time preference.

Six; no cost calculations are necessary in this method. This is because any inputs involved in any investment project will have an immediate effect on national income, if they must be drawn from other uses.

2. The model and its basic equations.

The model in its simplest form consists of two groups of economic variables. The first group of variables apply to the investment programme (all investment projects). The second group of variables apply to all variables within the economy outside the programme. The main purpose of the model is to compare real national income for all future periods with and without the investment programme. As Professor Jan Tinbergen has pointed out, "a project's contribution to national income¹ has, in principle, to be derived from a comparison between two well defined alternative

1. The investment programme contribution to future national income is the difference between the discounted total national income with the investment programme and the discounted total national income without such a programme. The best investment programme is that which maximises this difference. Apparently, the criterion of choice here is the discounted value of all future contributions of the project to the real national income evaluated at accounting prices.

developments of the economy, one where the project is carried out, the other where it is not carried out".⁽¹⁾

The first equation in the Tinbergen-King investment appraisal method shows the contribution of each investment project to total national income. Mathematically this can be stated as follows:-

$$Y^h = pV^h - pI_1^h - dpb^h - m^i_k i^h \quad (M.1)$$

The second equation defines the contribution of the rest of the economy to total national income. This equation is as follows:-

$$Y^o = pV^o - pI_1^o - dpb^o \quad (M.2)$$

In the above equations the symbols* have the following meaning:-

Y^o = the contribution to net national product of the rest of the economy

Y^h = ditto of project h

V^o = the quantity of the gross product in the rest of the economy;

V^h = ditto of project h;

I^o = the required volume of imports for the rest of the economy;

(1) See, J. Tinbergen, Economic Policy, op. cit., p.180.

* In the above equations the variables with the upper index o apply to all variables within the economy outside the programme sector. From henceforth we shall refer to the total of these variables as the o-sector, or the rest of the economy. With regard the project variables they are indicated by an upper index h, where $h = 1, 2, \dots H$ where H is the total number of projects in the development programme.

I^h = ditto by project h;

b^o = the real value of the capital stock in the rest of the economy;

b^h = ditto created by project h;

K^{ih} = the amount of foreign debts incurred for the execution of project h;

m^i = the interest rate for foreign debts;

p = the price level of the national product;

p^i = the import price level.

In the above equations the terms δ_{pb}^o , δ_{pb}^h and $m^i K^{ih}$ have the following meaning:-

δ_{pb}^o and δ_{pb}^h represent the depreciation allowances for the real value of the capital stock in the rest of the economy and the real value of capital that is to be created by project h; δ is the uniform depreciation rate.

The term $m^i K^{ih}$ represents the interest paid on the foreign debt incurred for project h.

In the above equations it is assumed that there are no deliveries between the rest of the economy sector and the programme sector (e.g. the o - and the h-sectors).

During the gestation period b^h is zero. v^h and i^h are the gross product and imports involved in the process of capital formation.

Now the question which confronts us is how the income distribution in each of the two sectors is to be determined? The following equations give the answer.

$$Z^o = {}^o Y^o \quad (M.3)$$

$$Z^h = {}^h Y^h \quad (M.4)$$

where Z represents the non-labour income, or the income of those who save part of their incomes. The share of this income in total income depends on the character of the investment project. That is to say, the more capital-intensive the project is; the higher the share of non-labour income in total income will be. The following equations however, determine the total savings available for investment in the rest of the economy (e.g. the o-sector)

$$X = \xi \frac{Y^o + \xi Y^h + \xi_o K^{ih}}{P} \quad (M.5)$$

$$S = \phi (Z^o + \xi Z^h) \quad (M.6)$$

Equation (M.5) indicates that total national expenditures (X_p) are a fraction of the sum of total income and total net capital imports (ξK^{ih}).⁽¹⁾

In equation (M.6) Savings (S) depend only on non-labour income. If taxes are to be introduced; the saving equation (M.6) will take the form:

$$S = \phi_1 (Z^o + \xi Z^h - T_d) + \phi_2 T \quad (M.6a)$$

where private savings are dependent on non-labour income after deduction for direct taxes (e.g. T_d) with a marginal propensity to save ϕ_1 , and public savings are a fraction ϕ_2 of total tax revenues (T).

Now how the import volume of sector $O(i^o)$ is to be determined?

Given a marginal propensity to import of C^o equation (M.7) determines (I^o).

(1) Equilibrium in the balance of payments implies $\xi = 1$.

$$I^o = C^o V^o \quad (M.7)$$

The equation indicates that the import volume of sector $o(I^o)$ is a function of its gross product.

Equation (M.8) determines the production in the rest of the economy. The equation however, has the character of a production function and the production in sector o is limited by the capital stock b^o .

$$\beta V^o = b^o \quad (M.8)$$

where β is the capital coefficient.

The net capital imports for project h is determined by the following equation:-

$$\dot{K}^{ih} = p^{ih} - \frac{1}{z} K^{ih} \quad (M.9) \text{ where}$$

\dot{K}^{ih} represents the net capital imports for project h and its value is derived by deducting the annual repayment of the foreign debt incurred for the project h from the gross capital imports which is assumed to be equal to the value of imports required for project h . The coefficient z in the above equation represents the period of repayment.

The two following balance equations determines the level of exports and total capital formation in the economy as a whole.

National product equation

$$V^o + \sum v^h = e + x + \sum (b^o + \sum b^h) \quad (M.10)$$

Capital formation equation

$$P(b^o + \sum b^h) = S + D + \sum K^{ih} \quad (M.11)$$

In equation (M.10) the total gross product $(V^o + \sum v^h)$ is distributed over exports (e) , net home demand (x) and replacement

investments which are supposed to be equal to depreciation $\delta(b^o + \sum b^h)$. The use of this equation is to determine what part of gross product is available for exports.

In equation (M.11) b^o and b^h represent the net increase of the capital stock in the rest of the economy and the h-sector, respectively. Thus the left hand term of this equation represents total capital formation in the economy. The right hand terms of equation (M.11) represents total domestic savings plus balance of payments deficit D and net capital imports (planned).

Now, the following equations define the balance of payments deficit on both capital and current accounts.

$$I = p^1 (i^o + \sum i^h) \quad (M.12)$$

$$E = p_e \quad (M.13)$$

$$D = I - E + m^1 \sum k^h - \sum \dot{k}^h \quad (M.14)$$

Equation (M.14) defines the balance of payment deficit on current and capital account.

As we have already pointed out that the main purpose of this method is how to choose out of a number of alternative projects the best investment programme. What is the best programme depends on the criterion on which the choice of the investment projects is to be based and on the prices that is to be used for the evaluation of the consequences. The present model however, suggests the use of accounting prices. This in turn requires the re-evaluation of the contribution of each sector to real national income. Allowing for this and assuming that the prevailing rate of exchange is 1 and the accounting rate is \bar{K} equations (M.1 and M.2) then will be:-

$$\bar{Y}^0 = p^v{}^0 - \bar{K}^{-1} p^i{}^0 - \sum pb^0 \quad (M.15)$$

$$\bar{Y}^h = p^v{}^h - \bar{K}^{-1} (p^i{}^h + K^{ih} m^i) - \sum pb \quad (M.16) \quad \text{where}$$

equation (M.15) refers to the contributions of the rest of the economy to net national product evaluated at accounting prices:

equation (M.16) refers to the contribution of the programme sector to net national product evaluated at accounting prices.

As the net national product is the sum of the contributions of both the programming sector and the rest of the economy sector it can be represented by the following equation

$$\bar{Y}^t = \bar{Y}^0 + \sum \bar{Y}^h \quad (M.17) \quad \text{where}$$

\bar{Y}^t = total real income evaluated at accounting prices.

Now, as regard to the criterion of choice, the discounted value of all future contributions of the project to the real national income has been suggested. Of course a preference function would be the ideal criterion but this we shall not consider in this chapter since we shall discuss it in the forthcoming chapter.

If however, \bar{Y}_1 is the future discounted value of national income at the middle of period one, its value can be derived as follows:-

$$\bar{Y}_1 = \sum_1^t \frac{\bar{Y}^t}{\prod_2^t (1 + \dot{n}_t)} \quad (M.18) \quad \text{where}$$

\bar{Y}^t is total real income evaluated at accounting prices and;

\dot{n}^t is the rate of discount at period t expressing the policy-maker time preference.

$$\Pi_2^t (1 + n_t^1) \text{ stands for } (1 + n_2^1) (1 + n_3^1) \\ \dots\dots\dots (1 + n_t^1)$$

Hence the best investment programme in view of this method is that which maximises the difference between the discounted total national income with the investment programme and that income without the investment programme.

3. Theoretical appraisal.

The previous method in its macro-economic set-up provides a new line of thought in the analysis of investment decisions. Furthermore it offers a complete and consistent description of the economy. As it may be obvious from the forgoing; the number of equations equals the number of endogenous variables. For instance we have $11 + 3H$ equations and we have also the same number of variables ($Y^0, Z^0, S, D, I, E, Y^h, Z^h, K^{ih}, v^0, i^0, x$ and e). Furthermore we have other variables expressing both the price level of imports and the price level of national product. Some of these variables are given, the others are to be known by solving the equations. The given variables are as follows:-

$$v^h, i^h, b^h, K^{ih}.$$

The model is said to be dynamic. This is because savings and capital imports secure the regular increase of the capital stock. In other words, the investment projects influence the capital stock through their contribution to savings.

4. Concluding Remarks:-

In conclusion, this method irrespective of its logical validity treats the rest of the economy as one sector. Furthermore, it might not be suitable within the statistical knowledge available to

the planning authorities. Among the practical difficulties involved are those concerning the determination of accounting prices, discount rates and the assessment of the indirect repercussions of the investment projects or programme on the economy as a whole.

To improve on this method is to improve the measurement of the indirect consequences of the investment projects and the methods of valuation.

If however this method is to be applied in practice what ought to be computed is the discounted value of real national income with and without the investment programme. The difference between the two developmental patterns of the economy indicates the investment programme contribution to real national income.

PART THREE

REFLECTIONS ON THE UNITED
ARAB REPUBLIC RECENT DEVELOPMENT PLANS
AND INVESTMENT PRIORITIES

"Rational investment planning is essentially a comparison between different projects. Whether a project is 'favourable' or not will depend on what other projects are available as alternative uses of the scarce resources. Therefore, all projects must be seen as parts of an overall picture of the economy as it is going now and as it would probably develop in the future if a specific global investment plan is accepted. This is the *raison d'être* of linear programming in investment planning".

Ragnar Frisch,
Optimal Investment Under
Limited Foreign Resources:
Part I, p.3 (Reference No.
77)

GENERAL INTRODUCTION TO PART THREE

Egypt, the United Arab Republic, in its vigorous struggle for a higher standard of living and for the building-up of a Socialist, Co-operative and Democratic pattern of Society, has instituted national planning and government initiative as a conditio sine qua non. (1)

In July, 1960, a comprehensive economic and social development plan was formally announced.(2) The general objective, as we shall see later on, is to double the 1959/60 level of net national product within ten years (i.e. by the end of June, 1970).

In the light of the theoretical framework we have established in the earlier chapters of this study and in accord with the present conditions of the Egyptian Economy, it is hoped in the proceeding chapters to examine critically the following five inter-related decisions connected with the actual formulation of the U.A.R. recent development plans in general and investment planning processes in particular.

-
- (1) Article 4 of the Provisional Constitution stipulates that the National Economy should be organised according to studied plans inspired by the principles of social justice and aiming at the development of production and the raising of the standard of living.
 - (2) United Arab Republic (Egypt), National Planning Committee, The Framework of a Five-Year Plan for Economic and Social Development, July, 1960 - June, 1965 (Cairo, 1960).

First, the determination of the rate of total investment (i.e. per cent of gross (or net) national product devoted to gross (or net) investment.(1)

Second, the distribution of the total investible resources among different sectors of the economy (e.g. agriculture, industry, services, etc.)

Third, the allocation of investment to individual investment projects.

Fourth, the determination of the degree of capital intensity (i.e. the technical form of investment).

Fifth, the distribution of the total amount of investible capital among different geographical areas within the country (i.e. the regional distribution of investment).

To begin with a brief analysis of Egypt's basic economic problems is given in the opening chapter. Chapter XII examines the present structure of the Egyptian Economy and its transformation under recent development plans. The appraisal of the first five-year plan in general and the question of investment priorities in particular is given in chapter XIII. Three questions connected

(1) The writer has not much to say on this question and he will conduct the discussion, so far as Egypt is concerned, on the assumption of a given rate of investment. In Egypt, however, total investment is determined by the Ministerial Planning Committee in its session of June 14, 1960 on the basis of the projects and programmes presented by the industrial ministries and organisations which are directly or indirectly responsible for the implementation of the proposed investment projects. According to the official estimates, domestic savings is scheduled to rise from 11% of national income in 1959/60 to 21% in 1964/65. That is to say from L.E. 204 millions in 1959/60 to L.E. 392 millions in 1964/65.

with the theory and practice of investment criteria are to be examined in Chapter XIV. These are :

- a) Has the discussion of investment criteria produced any enlightenment so far as Egypt is concerned ?
- b) Assuming that one or other criteria were to be tried out in Egypt , which one would be most suitable ?
- c) Are there further statistical problems of implementation not dealt with in the earlier sections of this study ?

There are also four Appendices, Viz. "A" and "B" provide information based on the experience of the Philippines and Turkey. Appendix "C" sheds some light on the use of " accounting " or shadow prices in project evaluation. Appendix "D" provides the potential reader with a selected Bibliography on investment criteria and related topics.

CHAPTER XI

EGYPT'S PRESENT POSITION AND BASIC ECONOMIC PROBLEMS

In this chapter we shall examine some of Egypt's basic economic problems. The aim of this chapter is to provide a general overview of the country's economic situation and to identify the main problems facing the country.

The first problem is the problem of population pressure. The population of Egypt is increasing rapidly. It is estimated that the population of Egypt in 1960 was 15.5 million, compared with 10.5 million in 1945. This rapid increase in population has led to a corresponding increase in the demand for food, clothing, and other necessities. The government is faced with the task of providing for the needs of this growing population.

CHAPTER XI

EGYPT'S PRESENT POSITION AND BASIC ECONOMIC PROBLEMS

The second problem is the problem of unemployment. The unemployment rate in Egypt is high, and it is increasing. This is due to the rapid increase in population and the slow growth of the economy. The government is faced with the task of creating more jobs for the unemployed.

The third problem is the problem of foreign exchange. Egypt's foreign exchange reserves are low, and they are decreasing. This is due to the high cost of imports and the low value of exports. The government is faced with the task of increasing its foreign exchange reserves.

The fourth problem is the problem of inflation. Inflation is high in Egypt, and it is increasing. This is due to the rapid increase in the money supply and the slow growth of the economy. The government is faced with the task of controlling inflation.

- (1) In 1945, the birth rate per thousand population was 42.7, whilst in 1960 it was 43.8. See for statistical tables the appendix to this chapter.

CHAPTER XI
EGYPT'S PRESENT POSITION AND
BASIC ECONOMIC PROBLEMS

In what follows we shall examine some of Egypt's basic problems before the era of comprehensive economic and social development planning.

First, and foremost, there is the problem of population pressure. Egypt's population is increasing rapidly. As it will be seen from table (11-1), the rate of population growth has already surpassed two per cent per annum. It is also worthy to mention that whilst the birth rate (1) per thousand of population did not register any substantial decline since 1945, the death rate per thousand population has decreased from 27.7 in 1945 to 16.8 in 1960, because of the continuous improvement in health conditions. Hence it is imperative to adopt a population policy aiming at a decline of the birth rate in Egypt. Otherwise there will be an increase rather than a decline in the existing rate of population growth as can be observed from table (11-2). *

Second, in Egypt there is a shortage of production of basic intermediate goods such as those materials whose outputs are needed for further production of means of production. Local demand for intermediate products such as steel, engineering and chemical goods, etc. is largely satisfied by imports. Foreign trade statistics in Egypt support this point.

Third, there is the balance of trade and payments problem which

(1) In 1945, the birth rate per thousand population was 42.7, whilst in 1960 it was 42.6.

* See for statistical tables the appendix to this chapter.

has required controls on foreign transactions for a number of years. So far as the balance of trade is concerned it will be seen from the following table that Egypt has been facing a deficit in that balance over a long period. Balance of payments estimates also show a deficit of about L.E. 55 million in 1952 and L.E. 14 million in 1960.

	1939	1952	1954	1956	1958	1959	1961
Exports (Value index) 1939 =100	100	417	399	395	455	429	448
Imports (Value index) 1939 =100	100	663	474	536	686	618	665
Balance of Trade (ooo's L.E.)	+1279	-79835	-20664	-43804	-74471	-60165	-69597

Source: Department of Statistics and Census, Cairo, United Arab Republic.

Fourth, there is the problem of illiteracy, health, technical knowledge and qualified personnel. Table (11-3) shows that about 70 per cent of the Egyptian population (10 years and over) are estimated to be illiterate. Out of the seven million persons who constitute the Egyptian civil labour force, nearly 5 millions are illiterate. About 0.5 per cent of the total population are university graduates. The problem of know-how and management is also in a backward state if compared with the standards prevailing in other advanced countries.

Fifth, there is the problem of regional disparities in the growth and prosperity of the various regions comprising the U.A.R. In table (11-4), I have worked out some approximate indicators to show statistically the existing differences in landownership,

value added, wages, education and health conditions among individual regions. Even in the rural districts there are substantial differences in per capita consumption of piped water. This can be observed from table (11-5).

Sixth, there is the problem of unemployment and underemployment. But the former problem is less acute than the latter. Available statistics on unemployment in Egypt show that only 3.9 per cent of the total labour force are wholly unemployed. It should be mentioned in this connection that unemployment in Egypt is more serious in large cities than in small ones.

Table (11-6) shows the incidence of unemployment with reference to the contribution of different age-groups in the labour force. For instance, the age-group 20 to 29 years contains the greatest number of unemployed persons. The rate of unemployment is also high among younger age groups. But if the problem of unemployment in Egypt is not so serious, the problem of underemployment is most pressing. It is moreover evident not only in agriculture, but also in industry and even in government institutions. Seasonality for instance affects a majority of the existing industries processing raw materials of agricultural origin including perishables. It is therefore necessary where there exists a surplus of labour in disguised or underutilized form to adopt policies that would secure the full utilization of the labour force. This can be achieved by transferring the labour surplus, when it occurs, to other economic activities where this labour can be best utilized without affecting appreciably the rural or industrial

activity in which this labour was previously occupied.

Finally, there is the problem of low levels of savings and income as it is the case in many less developed countries. Table (11-7) gives data on national income per capita (at both constant and current market prices) for the period (1913 - 1957). From this table it can be seen that during that period national income in Egypt was growing at a rate only sufficient to cope with the rate of population increase. During the period 1952-57, for instance, per capita income in real terms did not register any change. More recent data shows that during the last three years (1957 - 60), gross national product has increased by about 3.4 per cent per annum. Table (11-8) compares this rate with other developing countries undertaking at the present comprehensive development plans (1). It is clear from that table that whilst Japan, Yugoslavia, Greece, Columbia and Chile have higher growth rates for the previous four or five years; the Philippines, Egypt, Korea, Nigeria, India and Pakistan have low growth rates. Higher growth rates of the former group of countries are due in part to higher savings rates (compare item 6 in the previous table). The lower growth rates of the other countries reflect the lower efficiency with which these countries have utilized the capital available to them for investments (compare item 8 in table (11-8)).

So far however we have been discussing the basic problems of

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- (1) For further details see, H.B. Chenery, "Approaches To Development Planning", (paper presented to the Congress of International Economic Association, Vienna, September 1962.) (not yet published).

the Egyptian economy. To summarize, these problems are shortage of production of intermediate industrial products, underemployment, balance of trade and payments difficulties, regional disparities, the low rate of savings and per capita income and population pressure on the existing economic resources. Emanating from these basic problems of the Egyptian economy are other subsidiary ones, which include among others, social reform, trade and tariff adjustments, maintenance of reasonable price stability, reduction of income and wealth inequalities, mitigating the inherited discrepancies in the economic development of rural and urban regions of the Republic, revision of the tax structure and the improvement of the administrative machinery.

In the forthcoming chapter we will focus attention on the existing structure of the Egyptian economy and its transformation under the current comprehensive social and economic development plans.

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Table (11-1)

U.A.R., (Egypt) - Area and Population, 1960.

(A) AREA:-

A1. Total area (000's sq. kms.)	1002
A2. Inhabited area (000's sq. kms.) excluding deserts	35.4
A3. Cultivated area (000's sq. kms.) excluding deserts	24.5
A2, as percentage of A1.	3.5%
A3, as percentage of A1.	2.4%

(B) POPULATION:-

B1. Total population (000's)	26069
B2. Average annual rate of increase %	2.4%
B3. Density of population (per sq. km.) excluding deserts	739
B4. Urban population (000's)	9630
B5. Rural population (000's)	16439
B4, as percentage of B1.	36.9
B5, as percentage of B1.	63.1

Source of Basic Data: Adapted from Basic Statistics, Central Statistical Committee, Cairo 1961 and 1962. (In Arabic).

Table (11-2)
 U.A.R., (Egypt) - Projected Population,
 1962 - 1982

Age-group

Year	less than 20 years	20 to less than 65 years	65 years and over	Total
1962	13.6	12.7	1.1	27.4
1967	15.4	14.0	1.4	30.8
1972	17.5	15.7	1.6	34.8
1977	19.9	17.6	1.9	39.4
1982	22.8	19.9	2.0	44.7

Source: National Planning Committee, Cairo. (Unpublished materials).

Table (11 - 3)
U.A.R. (Egypt) - Distribution of Population (10 years and over) by
Level of Education (1960 Population Census).

Level of Education	Egypt.		Lower Egypt.		Upper Egypt	
	(ooo's)	%	(ooo's)	%	(ooo's)	%
Illiterates	12432	66.7	7364	64.5	5118	78.7
Read only	126	0.7	87	0.8	39	0.6
Read and write	3894	21.7	2845	25.0	1049	16.1
Less than intermediate	301	1.7	237	2.1	64	1.0
Intermediate	797	4.5	627	5.5	170	2.6
Intermediate less than higher	26	0.1	19	0.2	7	0.1
Higher schools and over	146	0.8	118	1.0	28	0.4
Unstated	136	0.8	103	0.9	33	0.5
Grand Total	17908	100.0	11400	100.0	6508	100.0

Source:- Adapted from Basic Statistics, Central Statistical Committee, Cairo, 1962.

Table (11-4)

U.A.R., (Egypt) - Some Selected Indicators
For Regional Disparities In Egypt

	(1)	(2)	(3)	(4)	(5)
	Landowner- ship per owner (in Feddans).	Average value added per worker (L.E.)	Average wage per worker (L.E.).	Illiterates as % of the total popu- lation of each region	Number of Population per Bed in Hospitals of the Ministry of Public Health
Cairo	1.4	324	128	46.5	260
Alexandria	12.6	470	138	48.9	390
Port-Said	)	313	181	50.0	251
Ismailia		665	136	66.5	450
Suez		986	350	55.6	467
Damietta	3.3	156	88	63.5	478
Dakahlia	2.4	306	105	67.7	798
Kalyubia	1.4	597	121	70.8	222
Sharkia	2.3	371	91	74.9	921
Kafr El Sheikh	3.1	272	61	82.8	892
Gharbia	1.6	392	148	70.4	1088
Menoufia	1.0	152	64	70.8	687
Behera	3.9	455	227	78.7	816
Giza	1.4	630	161	68.7	520
Beni Suef	1.9	311	85	77.4	919
Fayoum	1.7	219	91	80.2	982
Minya	2.2	380	99	78.6	764
Assuit	1.2	254	74	79.0	881
Sohag	1.5	453	106	83.1	1063
Kena	1.6	193	111	83.8	1001
Asswan	3.1	480	135	74.9	790
Frontier Districts	NA	698	174	NA	398
Total	1.9	455	145	69.7	583

Source of Basic Data:- Compiled from data prepared by the

Central Statistical Committee, Cairo, June, 1962.

Table (11-5)

U.A.R., (Egypt) - Average Annual Consumption
of Piped Water in Rural Areas in 1960.

Region	Population (000's)	Quantities Consumed (000's C. Mr.)	Average Annual Consumption per capita (C. Mr.)
1. <u>Lower Egypt:-</u>	7058	76830	10.8
Dakahlia	1969	31500	15.9
Sharkia	1108	8100	7.3
Kalyubia	540	2500	4.6
Kafr El-Sheikh	588	12030	20.2
Gharbia	832	4200	5.0
Menoufia	845	5000	5.9
Behera	1176	13500	11.4
2. <u>Upper Egypt:-</u>	4522	23870	5.2
Giza	510	2500	4.5
Beni-Souef	400	2000	5.0
Fayoum	800	10000	1.3
Assuit	807	3000	3.7
Minya	587	2600	4.4
Sohag	862	2700	3.2
Kena	496	950	1.9
Asswan	60	120	2.5
3. Grand Total	11580	100700	8.7

Source of Basic Data:- Compiled from data prepared by the Central
Statistical Committee, Basic Statistics, June, 1962. (In Arabic).

Table No. (11-6)

U.A.R. (Egypt) - Incidence of Unemployment

By Age Groups

Age group (years)	Proportion of all unemployed persons	Unemployment rate
12-15	13.0	6.0
16-19	12.4	5.8
20-29	22.6	5.4
30-39	16.7	3.5
40-49	13.9	3.6
50-64	19.5	5.4

Source: A.N. El Shafei, "The Current Labour Force Sample in Egypt (U.A.R.)", International Labour Review, Vol. LXXXII, July - December, 1960.

Table (11 - 7)
 U.A.R. Egypt - Per capita income at current and constant prices.
 (1913 - 1957)

	1913	1925	1935	1945	1952	1957
1. Population (in millions)	13.2	14.1	15.6	18.5	21.3	24.0
2. National income (at current market prices)	200	265	155	502	748	950
3. Per capita income (at current market prices)	15.5	18.5	10.0	27.0	35.0	39.5
4. National income (at 1954 prices)	476	530	500	523	693	780
5. Per capita income (at 1954 prices)	36.0	37.5	32.0	28.0	32.5	32.5

Notes:- Per capita income figures are in Egyptian Pounds.
 National income figures are in million Egyptian Pounds.

Source:- National Planning Committee, Cairo, 1959. (Unpublished material).

Table (11 - 8)
Criteria for Previous Growth Tendencies in some Selected Developing
Countries Preparing and Implementing at the present Comprehensive
Economic and Social Development Plans.

1. Planning period	58-70	62-65	62-66	60-64	62-67	62-67	63-67	61-65	62-66	61-67	61-65	61-65
2. Population in 1960	94	19	8	15	8	28	28	26	24	35	430	93
3. Population growth rate	1.0	1.2	0.9	2.8	2.6	2.9	3.2	2.5	2.2	1.9	2.3	2.2
4. GNP per capita	400	200	384	261	585	195	140	141	62	88	81	68
5. Previous growth in GNP	9.9	8.4	5.9	4.0	3.9	NA	3.5	3.4	3.2	3.1	3.0	1.2
6. Saving ratio (to GNP)	.30	.31	.15	.20	.12	.12	.13	.10	.04	.09	.14	.07
7. Investment ratio (to GNP)	.30	.37	.20	.20	.14	.16	.14	.17	.20	.16	.17	.13
8. Productivity of Investment	.27	.23	.36	.19	.40	NA	.41	.13	.24	.27	.25	.11

Notes:- (1) Population in millions.

(2) GNP per capita in U.S. dollars.

(3) NA means data are not available.

Source of basic data:-

H.B. Chenery, "Approaches to Development Planning", (paper presented to the Congress of the International Economic Association, Vienna, September, 1962).

CHAPTER XII

THE STRUCTURE OF THE EGYPTIAN ECONOMY AND ITS TRANSFORMATION UNDER RECENT ECONOMIC AND SOCIAL DEVELOPMENT PLANS.

"Only a person who knows the limitations
of utilized information can know the
limitations of conclusions based upon it".

Dr. Nazih A. Deif,
Under Secretary of State
for National Planning,
U.A.R. (Egypt).

CHAPTER XII

THE STRUCTURE OF THE EGYPTIAN ECONOMY AND ITS TRANSFORMATION UNDER RECENT ECONOMIC AND SOCIAL DEVELOPMENT PLANS.

1. The Structure of the Egyptian Economy:-

The Egyptian Economy is preponderantly agrarian. As it can be seen from the following table, about one third of the national income is contributed by the agricultural sector. In addition it made possible much of the income from trade (1) and services. A large part of the raw materials processed in industry is also supplied by agriculture. Furthermore, about 54 per cent of the civil labour force in Egypt is engaged in this occupation, viz., agriculture.

Table (12 - 1)

U.A.R. (Egypt) - The Structure of the Egyptian Economy,
1959/1960 (at 1959/60 prices and in Million Egyptian
Pounds)

Sector	%	
1) <u>Commodity sectors:-</u>	725	56.6
1.1 Agriculture	400	31.2
1.2 Industry and electricity	273	21.3
1.3 Buildings and Construction	52	4.1
2) <u>Non-commodity sectors:-</u>	557	43.4
2.1 Transportation and Communications	98	7.6
2.2 Public utilities and housing	80	6.2
2.3 Services (including trade & finance)	379	29.6
3) The National Economy	1282	100.0

Source:- National Planning Committee, Cairo, 1960.

Important though the agriculture sector is, its productivity is not high enough to support the ever increasing population and its requirements of a rising standard of living. Recent decades

- (1) In 1952, the value of exported cotton and cotton products as a percentage of Egypt's total exports was about 89%. In 1960, this percentage was about 78%.

however, have witnessed a growing pressure of population in relation to both cropped and cultivated areas. Table (12 - 2) shows that the population of Egypt has increased much more rapidly than the total cultivated area. In 1960, for example, the cropped area per head in the population was only 0.41 feddans as compared with 0.70 feddans in 1897. This remarkable decline

Table (12 - 2)

U.A.R. (Egypt) - Cultivated and Cropped Area
Per Head of Population, 1897-1960.

	1897	1907	1917	1927	1937	1947	1957	1960
Population (in millions)	9.7	11.3	12.8	14.2	15.9	19.0	24.0	26.0
Cultivated Area (in feddan)	5.1	5.4	5.3	5.5	5.3	5.8	5.8	5.8
Cropped Area (in feddan)	6.8	7.7	8.7	8.7	8.4	9.2	10.2	10.3
Cropping intensity	1.3	1.4	1.6	1.6	1.6	1.6	1.7	1.8
Cultivated area in feddan per capita	0.53	0.48	0.41	0.39	0.33	0.30	0.25	0.22
Cropped area in feddan per capita	0.70	0.68	0.68	0.61	0.52	0.48	0.42	0.41

- Notes: (1) Population figures are Census data.
 (2) One feddan equals 1.038 acres or 4201 sq. metres.
 (3) Cropping intensity is the proportion of cropped to cultivated area.

Source: Compiled from data prepared by:-

1. Dep. of Statistics & Census.
2. Central Statistical Committee, Basic Statistics, Cairo, 1960.

in both the cultivated and cropped area per head of population has forced the Egyptian government to adopt policies - as we shall see later on - aiming for agricultural expansion both horizontally and vertically. The importance of capital-intensive irrigation projects

such as the High Dam stems from the fact that in Egypt water for irrigation rather than land is the scarce factor in addition to capital and skilled labour which are also scarce.

All-in-all, the already existing under-employment in agriculture and the instability of both the yield and the price of agricultural products, and the uneven growth between the commodity producing sectors and the service sectors point to the need to industrialize to achieve a balanced pattern of economic growth. The limited capacity of agriculture to furnish remunerative jobs for the labour surplus already in existence and for those who are to come into the labour force make it for Egypt essential to develop other sectors in addition to the agricultural sector. This is, as far as Egypt is concerned, of utmost importance if the average level of output and income per person is to be levelled up. Through industrialization and urbanization the economy can fill its empty sectors and create new skills. But it ought to be kept in mind that the prospects of achieving a higher rate of growth in income and productivity can well be brought about by developing the economy simultaneously. To this aspect of comprehensive development planning we shall now turn to discuss briefly the U.A.R. recent practice.

2. The formulation of over-all economic and social development plans in the United Arab Republic:-

Convinced that the prospects of achieving a higher rate of growth in output and income can be achieved by the development of

the national economy as a whole, Egypt in July, 1960, has announced its comprehensive Ten-Year Economic and Social Development Plan. (1) Our task in this section is to give a quantitative account of this plan. A critical discussion of the First Five-Year Plan will be given in the forthcoming chapter.

On objectives of planning in Egypt, we would say that Egypt through planned economic and social development is aiming at achieving over the next ten years the following general objectives:-

- (1) To enlarge the size of the public sector in order to lead progress in all domains. The private sector is allowed to participate in the development of the economy within the framework of the overall plan and under the control of the government.
- (2) To create an industrial base through the development and application of suitable modern technology.
- (3) To create a suitable social and cultural environment through improving the levels of health and education of the population.
- (4) To create employment opportunities.
- (5) To reduce existing inequalities in income and wealth distribution through deliberate action such as nationalization and participation of the State in the ownership of newly acquired physical wealth.
- (6) To maintain price stability through government control.
- (7) To achieve a diversified pattern of exports and a viable balance of payment.

The Ten-Year Plan (1959/60 - 1969/70) however, sets out three broad objectives to be achieved - it is hoped - over the period of the plan. These are the following:-

- (1) The expansion of production at a rate that would lead to doubling the national income by the end of a period of ten years. During the first five years, national income is estimated to rise by 40%.
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- (1) The Egyptian Ten-Year Plan is laid down in stages of five years. Each stage is to be further divided into annual plans where the private and public resources are to be assessed and the means of their mobilization for achieving the hoped-for targets are to be worked out in detail. In the light of these targets the State budget as well as the autonomous budgets are to be prepared.

- (2) A deepening of the capital base of the economy through a rapid expansion of heavy industries such as basic products industries.
- (3) Additional employment opportunities for three million persons.

The Ten-Year Plan also provides detailed estimates for each sector. In what follows we shall give a quantitative description of the sectoral distribution of output, income and civil labour force.

I. The Agricultural sector:-

Table (12 - 3) shows that agricultural production is expected to increase from L.E. 574 million in 1959/60 to L.E. 910 millions in 1969/70, (by nearly 60 per cent above its base year level. This required increase is planned to be achieved through the horizontal and vertical expansion of the agricultural sector. By horizontal expansion is meant the increase of arable land. Since this type of expansion is fully allied to projects of irrigation and drainage, the Egyptian government has patronised the High Dam and its complementary projects. This Dam will help increase the cultivated land by about 1.3 million acres according to the government estimates.

But, it is however worthy of mention that the projects for horizontal expansion, will bear fruit in the second five-year period. During the first five-years, the proposed investment projects for the vertical expansion of the agricultural sector are those which are considered the main core of development. Furthermore it can be deduced from table (12 - 3) that the expansion during the first five years concentrates more on field crops, whilst in the second five years the emphasis is more on animal production in concordance with

the increase in lands.

From the same table, it can also be noticed that the rate of expansion in fibres is low. This is because the production of fibres is limited by the capacity of the economy to export and the local demand of weaving and spinning industries. In sum, in planning agricultural development in Egypt two principles have been taken into consideration. First, the economy should be freed from the strangle-hold of agriculture. Second, the expansion of the agricultural sector in all fairness to the rural population is imperative.

Table (12 - 3)

U.A.R. (Egypt) - Production Movements in Agriculture
(1960 - 1970)
(In Millions of Egyptian Pounds at
1959/60 prices)

	Production			Index Numbers		
	1960	1965	1970	1960	1965	1970
Fibres	136	168	179	100	124	132
Other field crops	160	217	261	100	135	163
Vegetables, fruits & trees	58	71	98	100	122	168
Fodder & animal products	200	253	339	100	127	169
Other crops	20	27	34	100	136	174
Total	574	736	910	100	128	159

Source: U.A.R. (Egypt), National Planning Committee.

2. The Industrial sector:-

So far as the industrial sector is concerned, the plan assumes a greater rate of production growth in industry than in agriculture.

Table (12 - 4) shows that industrial production is expected to increase

from L.E. 1905 million in 1959/60 to L.E. 2500 million in 1969/70. (by nearly 228% above its base year level). The production mix of industry is also portrayed in the abovementioned table. This table however, shows that Egypt is aiming at transform^{ing} its basic industrial structure from the production of consumer goods to the production of industries having a predominantly productive nature. The production of such industries is planned to increase from 16.5 per cent in 1959/60 to 33.6 per cent in 1969/70.

It is also worth noting that the growth of producer goods industries is faster during the first five years than it is during the second five years. This is because whilst in the first five years industries of a productive nature will have to fill gaps formerly filled by imports, in the second planning period it is hoped that the economy would stand on its feet depending on itself. To sum-up, the general aim of industrial policy in Egypt is to achieve self-sufficiency in industrial products previously imported, to expand industries the products of which could be exported and to set-up basic industries having spill-over effects on the rest of the national economy.

Table (12 - 4)

U.A.R. (Egypt) - Movements in Industrial Production
(1960 - 1970)
(In Millions of Egyptian Pounds at 1959/60 prices).

	Production			Index Numbers			Relative Importance (percentages)		
	1960	1965	1970	1960	1965	1970	1960	1965	1970
I. Producers' goods	182	561	806	100	310	334	16.5	30.9	33.6
1.1 Metal	22	74	120	100	338	545	2.0	4.1	5.0
1.2 Power	62	134	180	100	218	293	5.6	7.4	7.5
1.3 Machinery	61	236	323	100	393	538	5.5	13.0	13.5
1.4 Chemicals	37	117	183	100	313	491	3.4	6.4	7.6
II. Consumers' goods.	913	1253	1694	100	137	185	83.5	69.1	66.4
Total	1095	1914	2500	100	166	228	100	166	228

Source: See Table (12 - 3)

3. The Construction and Building Sector:-

Table (12 - 5) shows the activities of this sector during the whole period of the plan. The effects of transition from the stage of construction during the first five years to the next stage are quite obvious. The rate of construction necessary for agriculture, irrigation and drainage is decreasing over the planning years. The same would apply so far as the rate of construction for industry is concerned. On the other hand, it can be observed from the abovementioned table, that the rate of construction of housing, public utilities is expanding.

The reason for this is due - in the case of industry and agriculture - to the construction of the industrial base and of the irrigation projects in the first stage of planning. The expansion of construction of public utilities and housing is required during the second period in order to cope with the requirements of new areas where new agricultural lands are reclaimed and where new industries are to be erected.

Table (12 - 5)
U.A.R. (Egypt) - The Sectoral Distribution of the
Production of the Construction and Building Sector, 1960 - 1970).
(In Millions of Egyptian Pounds at 1959/60 prices).

	Production		Index	Numbers
	1960- 1965	1965- 1970	1960- 1965	1965- 1970
Housing and public utilities	171	268	24	34
Agriculture, irrigation and drainage	254	185	36	23
Industry and electricity	102	100	14	13
Other buildings and construction	178	242	25	30
Total	705	795	100	100

Source: See Table (12 - 3)

4. Basic Development Sectors:-

Table (12 - 6) shows the production level which may be realised by the basic development sectors which include housing, public utilities, transport, communication, internal security, justice, defence and public administration. These sectors however do not actually have a production that could be measured concretely or even directly. The calculations of production shown in Table (12 - 6) were measured in terms of market prices with full consideration of pushing the existing standard of these sectors to a level compatible with the realization of the general economic aims.

Table (12 - 6)
U.A.R. (Egypt) - Production Movements in the Basic
Development Sectors, 1960 - 1970.
(In Millions of Egyptian Pounds at 1959/60 prices)

	Production			Index Numbers		
	1960	1965	1970	1960	1965	1970
Internal transport and storage	74	83	115	100	113	156
External transport and Suez Canal	51	66	85	100	128	165
Communications	10	16	26	100	116	139
Housing Services	76	88	106	100	127	178
Public utilities	11	14	20	100	121	148
Security, justice and defence	91	110	135	100	121	148
Public administration	45	62	85	100	138	190
	358	439	572	100	122	160

Source: See Table (12 - 3)

5. Sector Trade and Finance:-

Table (12 - 7) shows the expected movements in this sector. Services are expected to increase because of the increase in the production of goods and the multiplicity of stages in industrial production, together with the concomitant increase in incomes and in banking and insurance activities. This sector however is similar to the basic development sector in as much as it adds an economic value to the economy.

Table (12 - 7)
U.A.R. (Egypt) - Production Movements in the Sector
of Trade and Finance, 1960 - 1970.
(In Millions of Egyptian Pounds at 1959/60 prices)

	Production			Index Numbers		
	1960	1965	1970	1960	1965	1970
Banks	13	18	24	100	138	185
Insurance	5	7	11	100	152	220
Wholesale & retail trade	145	183	285	100	126	197
Total	163	208	320	100	128	195

Source: See Table (12 - 3)

6. Services sectors:-

Table (12 - 8) shows the anticipated expansion in the production of services. Worth noting is that whilst the first period of the plan is considered a constructing stage, the second period is planned to witness greater expansion in the social field. This however is evident from the following table.

Table (I2.- 8)

U. A. R. (Egypt)- Production Movements of Services, 1960-1970.
(In Millions of Egyptian Pounds at 1959/60 Prices)

	Production			Index Numbers		
	1960	1965	1970	1960	1965	1970
Education Services	61	79	109	100	130	179
Health Services	21	29	48	100	135	223
Social & Religious Services	7	11	20	100	150	271
Cultural & recreational	21	29	44	100	139	212
Personal services	111	135	252	100	122	227
	221	283	473	100	128	213

Source: See Table (12 - 3)

In view of the previously mentioned sectoral production estimates, it is possible to draw a picture of the expected income to be generated in each sector. Table (12 - 9) * gives a condensed summary of base year data covering the present level of output, income and civil labour force. Furthermore, it sets out the required target increases in these aggregates over the planning period, (1960 - 1970).

The table however is self-explanatory and needs no further elaboration than to emphasise the role attributed to the industrial sector in the future development of the Egyptian economy. As it can be seen from table (12 - 10) which is prepared on the basis of data included in table (12 - 9), the share of the industrial sector in the overall target increments in output, income and civil labour force is 67%, 52% and 21% respectively. These percentages are for the first five years period. During the second five years (1965 - 1970) the contribution of the industrial sector to the above-mentioned aggregates is expected to be 60 per cent for output, 34 per cent for income and only

* For this table see the Appendix to this chapter.

10 per cent for employment. From table (12 - 10) one can also notice the target increments for the whole planning period (1960 - 1970).

This table also provides data to compare with the base year (1959/60).

Table (12 - 10)
U.A.R. (Egypt) - Proportional Distribution of Incremental
Production, Value added and Civil Labour Force, 1960 - 1970.
(Percentages)

	Output	Income	Employment
I. <u>Base-Year Data, 1959-60:-</u>	%	%	%
Agriculture	23	31	54
Industry	43	21	11
Rest of the Economy	34	48	35
Grand Total	100	100	100
2. <u>Plan Data 1960 - 1970:-</u>	%	%	%
(a) <u>First Five-Year Plan, 1960-65</u>			
Agriculture	15	22	54
Industry	67	52	21
Rest of the Economy	18	26	25
Grand Total	100	100	100
(b) <u>Second Five-Year Plan, 1965-70</u>	%	%	%
Agriculture	15	15	34
Industry	60	34	10
Rest of the Economy	25	51	56
	100	100	100
(c) <u>The Ten-Year Plan, 1960-1970</u>	%	%	%
Agriculture	13	18	41
Industry	48	41	14
Rest of the Economy	39	41	45
	100	100	100

Source: Based on Table (12 - 9)

All-in-all, the present outlook for the future of the Egyptian economy is to see it more dependent on industry than agriculture. This does not mean that the agricultural sector is to be neglected. On the contrary, as far as Egypt is concerned, agriculture and industry go together with special emphasis on the industrial sector.

Table (12 - 11) * pictures the Egyptian economy in 1970. From the table two major points can be deduced. The first point is that the Egyptian economy will then be more dependent on industrial production. Over the next ten years the share of the agricultural sector in the national income will decline from 31.2 per cent in 1960 to about 24.4 per cent in 1970. Secondly, in the first five years the economy as a whole will be more dependent on the commodity sectors (i.e. industry, agriculture and construction) than on non-commodity sectors (i.e. basic development sectors, trade and finance sectors and services sectors). Although this situation will continue over the period of the second five-years plan, the emphasis will be shifted on to the expansion of the non-commodity sectors in the forthcoming stages of national planning.

So far we have been mostly concerned with the sectoral distribution of production, income and employment targets. Here we shall proceed to mention that the plan also sets out targets for foreign trade and national consumption.

As far as foreign trade is concerned and in accord with the organisations, it is expected that exports will increase by 35.8% in the fifth year over the base year. Commodity imports are estimated to decrease by 6.2% in the fifth year of the plan. The structure of

* For this table see the Appendix to this chapter.

both exports and imports will also undergo some changes due to changes in the structure of services and uses of foreign trade.

The change in the structure of exports over the first planning period is outlined in table (12 - 12). This table shows that whilst exports of manufactured goods will increase, exports of non-manufactured goods such as cotton and other raw materials will decrease. The share of raw cotton in total exports is expected to decline gradually from 67% in the base year to 55% in the fifth year of the plan. This change is due to the increase in raw cotton domestically consumed over the plan years. (Note the planned increase in yarn and cotton textiles).

Table (12 - 12)

U.A.R. (Egypt) - Percentage Distribution of
The Main Items of Exports In 1959/60 and 1964/65.

Exports	1959/60	1964/65
Cotton	66.6	54.2
Yarn and Cotton Textiles	9.9	12.0
Agricultural products & foodstuffs	8.5	11.6
Crude and refined oil	3.4	3.4
Miscellaneous manufactured products	11.6	18.8
Total	100.0	100.0

The required change in the structure of imports is illustrated in table (12 - 13). From this table it can be noticed that whilst imports of both consumers' goods and intermediate production goods will decline by about 12% and 22% respectively; imports of investment goods will increase by about 20% between the base year of the plan and the fifth year. It is also worth noting that with the

industrial development and the diversification of industrial production, imports of manufactured goods are estimated to decrease although their ratio to total imports will increase in 1964/65 above the corresponding ratio for 1959/60 as shown in the following table.

Table (12 - 13)

U.A.R. (Egypt) - Imports by Type of Goods and The Ratio of Each Group to Total Imports in 1959/60 and 1964/65

	1959/1960		1964/1965	
	Value (L.E.Mill)	%	Value (L.E.Mill)	%
Agricultural raw materials	45	20	48	22
Mineral raw materials	10	4	-	-
Manufactured goods	174	76	167	78
Total	229	100	215	100

As mentioned earlier, national consumption is also studied in the Egyptian plans. The target for the first five years is 24 per cent above the base year level increase. That is to say, national consumption is planned to increase from L.E. 876 millions in 1959/60 to L.E. 1086 millions in 1964/65. The structure of consumption is expected to undergo changes over the planning period. As it can be deduced from table (12 - 14), consumption of foodstuffs, beverages, tobacco and its products will surpass its base year level by about 22%. Final consumption of yarn, textiles, clothes and shoes will also rise in the fifth year by about 30% over the base year. Consumption of books, magazines other publications and paper will increase by 54%. Public and private consumption of electricity and fuel will also increase by 41%. Consumption of medicines, drugs and other chemicals will increase by 28%. Household furniture, household utensils, equipment and apparatuses such as radios, refrigerators and gas stoves, will increase by about 22%. The rest of changes in final consumption can be seen from the following table.

Table (12 - 14)

U.A.R. (Egypt) - Development in the Structure
of Consumption of Goods in 1959/60 and 1964/65.

(Value in Million Pounds and Ratio's as Percentages of Totals)

	1959/60		1964/65	
	Value	%	Value	%
Foodstuffs, beverages and tobacco	578	66	703	65
Clothes, textiles and shoes	138	16	179	17
Books, publications and paper	20	2	31	3
Medicine, soap and other chemicals	27	3	35	3
Electricity and fuel	36	4	51	5
Household furniture, utensils and electrical appliances	38	4	46	4
Transport equipments	19	2	20	2
Miscellaneous other products	20	2	21	2
Total	876	100.0	1086	100.0

The point we have to mention in connection with the development of consumption over the planning period 1959/60 - 1964/65 is that whilst national income is expected to increase by 40%, national consumption is planned to increase by only 24%. It is therefore interesting to note that the Egyptian plan provides from within an additional source of financing future social and development projects provided that the potential surplus is to be directed for reinvestment.

In addition to this implicit source of finance, provision is also made for an annual foreign exchange budget consisting of all expected

receipts in foreign exchange. These receipts are to be allocated among consumption, intermediate and capital goods in such a way as to ensure the implementation of some of the projects included in the plan over the planning period.

To remind the reader of the main targets of the First Five-Year Plan of Egypt, we have produced table (12 - 15) in percentage form. This table however, summarises the hoped-for targets in the fifth year of the plan as compared with the base year (1959/60).

Table (12 - 15)
U.A.R.(Egypt) - Planned target increases in output,
income and other variables in percentages of base year data

Item	%
Target increase in gross domestic product	42.2
Target increase in national income	40.0
Target increase in civil labour force	17.0
Target increase in national consumption	24.0
Target increase in wages	34.0
Target increase in exports	35.0
Target increase in labour productivity	21.8

Source: Based on previous tables

To sum up, if the hoped-for targets as anticipated by the planners and policy-makers of the United Arab Republic were realised, the average income per family unit would be increased by about 62 per cent as compared with the base year level. Moreover, the average annual income of the working individual would rise by about 33 per cent as compared with the 1959/60 level, as shown in table (12 -15).

Table (12 - 16)
UAR, (Egypt) - Future Indicators
(1960 - 1970)

Selected Indicators	1960	1965	1970
Population	25.7	28.7	31.7
Ratio of the working force to population	23.5	24.7	28.2
Number of families (in millions)	5.1	5.7	6.3
Average output per capita (in L.E.)	98	125	156
Average income per capita (in L.E.)	50	62	81
Average annual income of working individual (in L.E.)	215	256	287

3. Investments Requirements:-

To achieve the forementioned output, income and employment targets, the plan envisaged a total investment of L.E. 1697 millions in 1959/60 (at an average of about L.E. 399 millions annually). This amount of investments is required for the period 1960-65. For the next five years (1965-70), about L.E. 1717 million is needed (in 1959/60 prices).

It should however be mentioned here that whilst the total value of investments for the First Five-Year Plan and their sectoral distribution were determined by the Ministerial Planning Committee in its session of June 14, 1960, (1) capital investment requirements for the second planning period are only provisional calculations made by the National Planning Committee in the light of the information available for the first planning period. (2)

- (1) These estimates were calculated on the basis of the projects and programmes presented by the various ministers and organisations directly or indirectly responsible for carrying out these investments.
- (2) In a private discussion with some planning experts at the National Planning Committee of Egypt, I knew that gross investment were determined in accordance with product ratios. For the economy as a whole the implicit investment - output ratio is of the order 3 to 1.

In the Egyptian planning practice a distinction has been made between investment in real terms and investment in money terms. On definition, "investment is a process of using goods and services in the creation of new productive capacities and/or the maintenance and renewal of existing ones". According to this definition, investment in real terms consists of equipments and means of transportation, buildings, construction, and the value of land. Money investment on the other hand represents the money equivalent of both fixed assets and inventory, expressed in local and foreign currencies. Whilst local currencies represent the value of goods and services locally produced evaluated in Egyptian pounds; foreign currencies represent the value of imported goods and services, evaluated in Egyptian pounds.

Table (12 - 17)* shows total investment and its distribution by type of currency required and economic activity. Table (12 - 18)* gives a more detailed picture of the structure of investment and its distribution during the first five-year plan (1959/60 - 1964/65). The investment figures as shown in these tables presumably include projected investment by the private sector but exclude changes in stocks.

From tables (12 - 17) and (12 - 18), it can be observed that the industrial sector including electricity has had more than one third of total investments (36.7%). During the period 1959/60 - 1964/65 the manufacturing industry is scheduled to receive L.E. 386.2 million (about 67 per cent of total investment in the industrial sector), electric power generation L.E. 140 million, mining and quarrying L.E. 53 million.

* For tables No. (12 - 17) and (12 - 18) see the appendix to this chapter.

The reader may also deduce from the figures cited in the above-mentioned tables, that Egypt has assigned an important role to the manufacturing industry. Going into further detail on project basis we note that in the manufacturing industry there are seventy projects in the food processing group (beverages, tobacco, sugar and cold storage facilities) with an allocation of L.E. 32 million; in the textile group (cotton, wool, linen and artificial silk yarn and fabrics, as well as jute and jute bags, dyeing and knitting) with an allocation of L.E. 49 million. In the paper industry there are fifteen projects with an allocation of L.E. 21 million. Seventy projects are in the chemical and pharmaceutical group with an allocation of L.E. 67 million. Ten projects are in the petroleum group (mainly petro-chemicals, lubricating oil and the expansion of the oil refineries in Suez and Alexandria) with an allocation of L.E. 66 million. There are also about 26 projects in the metallurgical group (steel and steel products) with an allocation of L.E. 47 million. In the vehicle industry (shipbuilding, assembling of passenger cars and trucks, railway cars and spare parts) with an allocation of L.E. 40 million. In the heavy machinery branch (mainly diesel machines, tractors and spinning and weaving machines) there are nineteen projects with an allocation of L.E. 12 million. Military factories and replacement of parts received a further allocation of L.E. 48 million. There are also technical training centres designed to meet the manpower requirements of the existing and planned industries, with an allocation of L.E. 5.5 millions.

In the mining industry, there are forty-nine projects with a total

allocation of L.E. 53 million. It is planned to spend this amount on prospecting for and development of coal, copper, iron mines, phosphates, lead, gold and glass sand.

As it can be seen from table (12 - 18) the motive power industry includes sixty-two projects with a total allocation of L.E. 140 millions. This expenditure is planned for the construction of several thermal and hydro-power stations, the expansion of existing generating capacity (with special emphasis on that serving industrial centres), the building of sub-stations, and the extension of the distribution network to supply power to about eighty-seven towns and villages not at present served with electricity.

So much for the industrial sector. Next in order of magnitude comes the basic development sector (31.4%). This sector includes transportation, communication and storage; housing and public utilities. There are however about 166 projects covering transport activities (i.e. railways, river and maritime transport and air transport) with an allocation of L.E. 80 million. The communications and storage sectors include 102 projects. Ten projects have been designed to improve the Suez Canal.

So far as the housing programme is concerned, the aim is to provide subsidised adequate housing facilities to families of low income. Some 290,000 dwelling units are to be constructed according to this programme. Of these more than two thirds are for the families of limited income. The remaining third is apportioned between average and above average type of houses, in the proportion of 3: 1. The housing programme calls also for the replacement of 13,000 old housing

units by new ones.

The public utility programme is designed to extend the availability of potable water and sewage facilities. This sector however includes about 27 projects with an allocation of L.E. 49 million.

Table (12 - 18) also shows that the agricultural sector (including irrigation and drainage and the High Dam) has had about a quarter of total investments (24.9%). The projects included in this sector are of the type aiming towards the improvement of land and its productivity through the vertical expansion of agriculture. Furthermore it includes projects the main purpose of which is to increase the arable land such as the High Dam.

So far as the services sector is concerned, it includes projects aiming at improving health and education conditions in the Republic. It also includes projects aiming at the extension of social security services. In the public sector for instance, employees are covered against death, complete or partial disablement. The system of insurance provides also for retirement pensions by the end of 20 years of service. But the reader may notice from table (12 - 18) that this sector has had only 7 per cent of the overall investment programme.

Table (12 - 18) also provides data about the distribution of total investments by type of currency required and by type of capital asset. During the first planning period (1959/60 - 1964/65); the foreign currency required for the implementation of the scheduled investment projected amounts to about L.E. 646 million (or 38% of total investments excluding the value of changes in stocks which amounts to about L.E. 120 millions and at 1959/60 prices). Capital investment

requirements in foreign exchange during the period 1964/65 - 1969/70 amounts to about one third of total investments, (i.e. L.E. 549 millions out of L.E. 1717 million).

So far as the structure of investment is concerned, available data shows that building and construction materials form a considerable percentage of the total structure of fixed capital formation. Next in order of magnitude comes equipment and machinery as shown in the following table which is based on table (12 - 18).

(L.E. millions)

	Value	%
Building and Construction	705.1	44.7
Equipment and Machinery	662.2	42.0
Means of transportation	149.1	9.5
Land	60.5	3.8
Total	1576.9	100.0

Finally, the Plan also provides estimates for the regional distribution of investments and table (12 - 19)* shows the share of each region in the total investment during the period 1960-1965. From this table it can be observed that Cairo and Alexandria, the most urbanized regions in Egypt, received about 30% of the total planned investment expenditure. This however gives an indication for the location of the proposed new investment projects.

Having reached this stage of our investigation, the question now arises: Is the first Five-Year Plan feasible? Is its basic approach

* For this table see the appendix to this chapter.

sound? Are its priorities paying much attention to economic considerations? It is the purpose of the forthcoming chapter to shed some critical light upon these broad questions.

APPENDIX TO CHAPTER XII
STATISTICS OF THE PLAN

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Table (12 - 9)
 UAR, Egypt: Present and Target Output, Income and Civil Labour Force by
 Major Heads of Development,
 1959/60 - 1969/70.
 (Persons in Thousands, Output and Income in Millions of Egyptian pounds
 at 1959/60 prices.)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
	1959/60			1964/65			1969/70			First Five Year Target Increase			Second Five Year Target Increase			Overall Target Increase (1960-1970)		
	Out- put	In- come	Employ- ment	Out- put	In- come	Employ- ment	Out- put	In- come	Employ- ment	Out- put	In- come	Employ- ment	Out- put	In- come	Employ- ment	Out- put	In- come	Employ- ment
Agriculture, irrigation and drainage (including a part from the High Dam)	574	400	3245	736	512	3800	910	627	4460	162	112	555	174	115	660	336	227	1215
Industry and Electricity (including the High Dam power station)	1094	273	632	1814	540	847	2500	802	1045	720	267	215	686	262	198	1306	529	413
Building and con- struction	115	152	170	122	51	159	167	75	221	7	-1	-11	45	24	62	52	23	51
Basic development sectors ⁽¹⁾	358	261	502	438	316	551	572	435	705	80	55	49	134	119	154	214	174	203
Trade and Finance	163	127	633	208	162	730	320	265	1060	45	35	97	112	103	330	157	138	427
Services ⁽²⁾	221	169	793	283	214	914	272	360	1445	62	45	121	-11	146	531	51	191	652
	2525	1282	5975	3601	1795	7001	4941	2564	8936	1076	513	1026	1140	769	1935	2716	1282	2961

Notes: (1) Basic development sectors include housing and public utilities, transport and communications, internal security justice and defence and public administration.
 (2) Services sectors include education, health, social and religious services, cultural and recreational services, personal services.

Source of Basic Data: Adapted from The Framework of a Five Year Plan for Economic and Social Development, July 1960 - June 1965, National Planning Committee (Cairo, 1960) (in Arabic)

Table (12 - 11)
UAR. (Egypt) - The Structural Distribution of National Income
in 1970 as compared with 1960 and 1965.

	1959/60	1964/65	1969/70	Index Numbers 1959/60 = 100					
	(L.T. M.)	%	(L.T. M.)	%	(L.T. M.)	%	$\frac{Col.(3)}{Col.(1)} \times 100$	$\frac{Col.(5)}{Col.(3)} \times 100$	$\frac{Col.(5)}{Col.(1)} \times 100$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1. <u>Commodity Sectors:-</u>									
Agriculture & related activities...	725	56.6	1103	61.4	1504	58.6	152.1	136.4	207.4
Industry & Electricity...	400	31.2	512	28.2	627	24.4	120.0	122.5	156.7
Building & Construction.	273	21.3	540	30.1	802	31.3	+197.8	148.5	293.8
	52	4.1	51	2.8	75	2.9	(-) 9.8	147.1	144.2
2. <u>Non-Commodity Sectors:-</u>									
Impulse sectors.....	557	43.4	692	38.6	1060	41.4	124.2	151.7	188.5
Commerce.....	261	20.3	316	17.6	435	16.9	21.1	137.7	166.7
Other	127	9.9	162	9.1	265	10.3	27.5	163.6	208.6
Services.....	169	3.2	214	11.9	360	14.1	26.5	160.2	213.0
3. Grand Total	1282	100.0	1795	100.0	2564	100.0	140.0	142.8	200.0

Notes: Column (8) reflects the planned increase in Real National Income in the 10th Year of the Plan as compared by the 5th year of the Plan.

Source: Adapted from detailed estimates prepared by the National Planning Committee, Cairo, 1960.

Table (12 - 17)
UAR, (Egypt) - Total Investment and its Sectoral
Distribution between Foreign and Domestic Currencies.
(Millions of Egyptian pounds at 1959/60 prices)

	1960 - 65				1965 - 70			
	Foreign	Local	Total	%	Foreign	Local	Total	%
1. Agriculture, irrigation and drainage	78.9	313.1	392.0	24.9	84.0	328.0	412.0	23.9
2. Industry and Electricity	375.0	203.7	578.7	36.7	300.0	255.0	555.0	32.3
3. Basic Development Sectors	159.3	335.9	495.2	31.4	125.0	465.0	590.0	34.5
4. Services	32.8	78.2	111.0	7.0	40.0	120.0	160.0	9.3
Grand Total*	646.0	930.9	1576.9	100.0	549.0	1168.0	1717.0	100.0

* Excluding changes in stocks

Source:- General Frames of the 5-Year Plan for Economic and Social Development, July, 1960 - June, 1965, National Planning Committee, (Cairo, 1960) (in Arabic)

Table No. (12 - 18)

U.A.R. Egypt - The Distribution of Over-all Investments by type of Activity, Currency Required and Assets used During the First Five-Year Plan (1959/60 - 1964/65)

(L.E. Millions)

	Number of Projects	Foreign	Local	Total	Land	Build- ings & Construc- tion.	Equip- ment & Machi- nery.	Means of Trans- porta- tion.	Live- stock
I. Agriculture, Irrigation and drainage:-	177	78.9	313.1	392.0	8.8	254.4	102.1	16.5	10.2
1.1 Vertical expansion in agriculture	163	15.6	36.9	51.9	1.1	22.2	22.2	5.0	1.4
1.2 Horizontal expansion in agriculture	4	38.8	134.6	173.4	-	106.1	47.3	11.2	8.8
1.3 Irrigation & drainage	1	13.1	106.3	119.4	7.7	98.6	12.8	0.3	-
1.4 The High Dam		12.0	35.3	47.3	-	27.5	19.8	-	-
2. Industry and Electricity:-	507	375.0	203.7	578.7	4.0	102.2	459.9	12.6	-
2.1 Mining & petroleum & mining researches	49	32.0	21.0	53.0	0.6	7.5	36.0	8.9	-
2.2 Food, beverages & tobacco industries	70	16.0	15.7	31.7	0.5	8.0	22.9	0.3	-
2.3 Spinning, weaving & clothes	77	32.7	15.9	48.6	-	10.7	37.4	0.5	-
2.4 Wood & wood products	9	0.8	0.4	1.2	-	0.2	0.9	0.1	-
2.5 Paper and its products	15	12.4	8.2	20.6	0.1	4.5	15.7	0.3	-
2.6 Chemical & drug industries	70	45.4	21.3	66.7	0.9	8.2	57.1	0.5	-
2.7 Petroleum products	10	46.7	19.5	66.2	0.2	2.6	63.6	0.1	-
2.8 Non-Metallic industries	6	0.7	0.8	1.5	0.1	0.4	0.9	0.1	-
2.9 Metallic industries & products	45	29.8	17.1	46.9	-	11.5	34.9	0.5	-
2.10 Manufacturing & repairing electric & non-electric machines	33	6.3	5.0	11.3	0.1	4.2	11.3	0.2	-
2.11 Manufacturing means of transportation	15	2.7	1.8	4.5	-	1.2	3.2	0.1	-
2.12 Other engineering indus- tries	10	1.6	1.4	3.0	0.2	0.5	2.3	-	-
2.13 Rural industries	18	0.6	1.3	1.9	-	0.5	1.4	-	-
2.14 Vocational training & standardization	17	3.2	2.3	5.5	-	1.5	4.0	-	-
2.15 Military factories	-	3.0	2.0	5.0	-	-	30.0	-	-
2.16 Renewals and Replacements	-	30.0	-	30.0	-	-	30.0	-	-
2.17 Electricity	62	88.7	50.8	139.5	1.0	30.8	107.4	0.3	-
3. Transportation, Communication and Storage:-	378	112.2	159.6	271.8	2.6	113.0	58.0	98.2	-
3.1 Transport	166	79.6	115.9	195.5	2.3	81.9	22.0	89.3	-
3.2 Communications	102	13.8	17.5	31.3	0.1	7.5	23.0	0.7	-
3.3 Storage	10	3.0	7.0	10.0	0.2	5.1	4.6	0.1	-
3.4 The Suez Canal	10	15.8	19.2	35.0	-	18.5	6.4	8.1	-
4. Housing:-	5	29.4	145.2	174.6	34.3	139.7	0.3	-	-
4.1 Urban housing (additions)	2	21.0	112.0	133.0	13.0	99.8	0.2	-	-
4.2 Replacement in towns	1	3.0	10.0	13.0	-	12.9	0.1	-	-
4.3 Housing in present rural areas	1	3.4	15.1	18.5	1.5	17.0	-	-	-
4.4 Housing in newly reclaimed lands	1	2.0	8.1	10.1	0.1	10.0	-	-	-
5. Public Utilities:-	27	17.7	31.1	48.8	1.2	31.2	11.1	5.3	-
5.1 Drinking Water	13	7.6	9.4	17.0	-	11.0	6.0	-	-
5.2 Sewers	7	5.7	12.2	17.9	-	13.0	4.9	-	-
5.3 Organization & Planning	2	-	4.4	4.4	1.2	3.1	0.1	-	-
5.4 Mobile units & mechanical equipment	2	4.0	1.3	5.3	-	-	-	5.3	-
5.5 Marsh filling	2	-	0.4	0.4	-	0.4	-	-	-
5.6 Municipal installations	1	0.4	3.4	3.8	-	3.7	0.1	-	-
6. Services:-	137	32.8	78.2	111.0	9.3	64.6	30.8	6.3	-
6.1 Education	54	9.7	32.8	42.5	3.3	26.9	12.2	0.1	-
6.2 Scientific researches	5	3.9	2.5	6.4	0.3	2.0	4.0	0.1	-
6.3 Health	14	4.7	5.7	10.4	1.4	4.5	4.3	0.2	-
6.4 Security & Justice	19	1.7	6.8	8.5	1.1	4.5	1.7	1.2	-
6.5 Social & religious services	13	1.5	3.7	5.2	0.3	3.3	1.4	0.2	-
6.6 Cultural & recreational "	20	1.9	6.9	8.8	0.9	4.6	2.4	0.9	-
6.7 Tourism	9	3.2	7.4	10.6	1.0	3.6	4.0	2.0	-
6.8 Fire bridge & first aid	1	1.5	0.4	1.9	-	-	0.3	1.6	-
6.9 Govtl. & private bldgs.	1	3.0	12.0	15.0	1.0	13.5	0.5	-	-
6.10 Min. of Foreign affairs	1	1.7	-	1.7	-	1.7	-	-	-
Grand Total (excluding changes in Stocks)	1231	646.0	930.9	1576.9	60.5	705.1	652.2	138.9	10.2

Table (12 - 19)
 UAR, (Egypt) - The Regional Distribution of Investments,
 1960/61 - 1964/65
 (Millions of Egyptian pounds at 1959/60 prices)

Region	L.E. (m.)	%
Cairo	225	20.0
Alexandria	126	9.8
Port Said	25	2.0
Ismailia	7	0.6
Suez	65	5.1
Damietta	9	0.7
Dakahlia	31	2.5
Sharkia	41	3.2
Kalyubia	39	3.1
Kafr-El-Sheikh	49	3.9
Gharbia	28	2.2
Menoufia	23	1.8
Behera	56	4.3
Giza	28	2.2
Beni Souef	20	1.5
Fayoum	18	1.4
Minya	30	2.4
Assuit	33	2.6
Sohag	31	2.4
Kena	49	3.8
Asswan	162	12.6
Al-Tahrir Province	24	1.9
Frontier Governorates	128	10.0
Total	1277 ⁽¹⁾	100

Source: United Arab Republic (Egypt), National Planning Committee (Cairo.)

(1) Compare table (12 - 18). The difference is allocated to more general items not related to a particular region.

CHAPTER XIII

THE APPRAISAL OF THE PLAN

"Criticism and self-criticism are among
the most important guarantees to freedom."

President Abdel-Nasser.

CHAPTER XIII

THE APPRAISAL OF THE PLAN

1. Introductory note and intent:-

In the last two chapters we have attempted to condense into a few pages the current problems of the Egyptian Economy and the salient features of the Ten-Year Social and Economic Development Plan which bears directly on the aspirations and future welfare of over twenty-six million people living in this area of the Arab world.

As it can be inferred from the preceding chapter, the Egyptian plan is supply-oriented. This is because its main objective is to increase the productive capacity of the national economy so as to spread a prosperous life among the population of Egypt. Furthermore the plan is not only a political symbol of the government and the people commitment to economic and social advancement but it is also a general strategy for remodelling the economy and its basic production structure.

The appraisal of the First Five-Year Plan of Egypt is our overriding consideration in this chapter. Our task will be fruitful if we examine the worthwhileness of the Plan in terms of actual achievements. The evaluation test in this case will quantitatively reveal the gaps, if any, between what the planners took as their targets and what is to be actually achieved. But since actual data on implementation are not enough to carry on the investigation, it is by no means possible to apply the actual test.

Within the information available, this chapter examines critically the plan's basic approach, its size and composition. The object of the

exercise is to discover the main weaknesses of the First Five-Year Plan and to suggest some improvements on the procedures thus far used in preparing the Plan with special emphasis on the question of investment priorities.

To begin with we list the following assumptions upon which the First Five-Year Plan rests:-

- (1) The estimates of capital requirements, output, income and civil labour force thus far made by the individual ministries and other institutions which has participated in the actual preparation of the plan represent the most that can be achieved from the resources which are available to these agencies.
- (2) It has been explicitly stated that both product and factor prices remain constant over the period of the plan.
- (3) The availability of finance over the planning period.
- (4) The availability of markets for the disposal of products and the receiving of inputs (including foreign trade) at base year prices, i.e. 1959/60.
- (5) No change in government instruments (tax rates, exchange rates, public expenditure) other than what has been allowed for in the Plan draft.
- (6) Finally, the plan sets as a necessary condition for realizing the planned targets, that both consumers and producers (including the government) act in their actual behaviour in accordance with the propositions of the Plan.

2. Approaches to development planning in Egypt:-

In searching for techniques and procedures of planning in Egypt I have found more than one approach. The first I shall call the departmental approach. The second is the input-output approach. (1) The third is the Channel model approach (2) and the application

- (1) In this connection it should be mentioned that two input-output tables have been so far constructed for the Egyptian economy, one for the year 1954 and the other for the year 1959. The former is of the order of 83×83 and was later aggregated to 33×33 and 7×7 . The 1959 table is of the order of 33×33 and a 7×7 table is also worked out. Both tables were constructed by the Input-Output Unit of the National Planning Committee. This approach however is not directly related to the current development plan. For this reason we are not going to discuss it in this study. For reference see, G. Eliesh, "The Applicability and Utilization of input-Output Model In A Developing Economy", a paper presented to the International Conference On Input-Output Techniques: ST/STAT/CONF.10/L.13, 26, July 1961. Copies in mimeographed form are also available at The Institute of National Planning, Cairo, Memo. No. 168.
- (2) The term channel indicates that the projects are aggregated in certain investment channels. At the present however and in the Institute of National Planning, Cairo; Professor R. Frisch is applying a variant of Oslo decision model under the designation of the Channel model. According to this approach the optimal planning problem is formulated as the problem of calculating a deviation price for each of the controlled variables. That is, a comparative figure that expresses how much it would cost (in terms of units of the preference function) to deviate from the solution which is optimal from the viewpoint of the economic goal which has been set. The work is in progress and the results have not yet been worked out. But it should be mentioned that this approach has nothing to do with the actual formulation of the current development plan. For further details on Professor Frisch approach see his mimeographed volume, Optimal Investments Under Limited Foreign Resources, Oslo Institute of Economics, Part One and Part Two, 1959.

Details about the role assigned to such planning organizations in the United Arab Republic. It is sufficient however to point out that the current plan is the culmination of the previously stated stages.

of modern programming techniques. Although these approaches are links in a common chain, in this section we will only focus attention on the departmental approach since it is the one which is actually used in preparing the First Five-Year Plan, (1960-65).

On examination it appears that the procedure of planning in Egypt begins with the step undertaken by the Supreme Council for Planning headed by the President. The main task of this Council is to determine the national economic and social objectives. Through successive steps the predetermined national objectives are translated into a comprehensive plan which states the necessary financial, economic and social tools of implementation. The council has also the right to ratify the Plan once it is completed.

There are also the following stages of planning:-

- (1) Planning undertaken by the institution controlling individual enterprises such as the Nasr Organization and the Misr Organization, etc.
- (2) Planning in the ministry responsible for the particular production sector (e.g. Ministry of Industry, Ministry of Agriculture, etc.).
- (3) The Ministerial Committee for Planning, formed of the State Ministers mostly concerned with development, and finally,
- (4) The Planning Commission which has no executive authority at all.

It is not our main concern in this section to go into further details about the role assigned to each planning organization in the United Arab Republic. It is sufficient however to point out that the current plan is the culmination of the previously stated stages.

On criticism we would say that the technique thus far used in preparing the present plan is partial in concept despite the fact that the plan includes the activities of the private sector. This is because the plan was not prepared with the help of a macro - decisional analytical device. On the contrary, the approach used in planning is one in which the various ministries, government departments, public and private institutions in the U.A.R. approach the Central Planning bodies in the Republic with individual projects covering various economic and social activities.

More to the point is the fact that the estimates of both the amount of capital requirements and the output figures were estimates of these individual organizations. Each decision - making unit in the Republic - at the ministerial level - has adopted its own scale of values and methods of forecasts with little emphasis on what is prevailing elsewhere.

The central planning body, which in principle, should re-appraise and scrutinize the proposed investment projects comprising the overall plan, has accepted these estimates on the responsibility of the individual ministries. Most of the individual projects submitted by the individual ministries have been included in the plan without being appraised and selected according the yardstick of national costs and benefits or a well-established investment priority system which takes into account the various interdependences between individual decisions. The task performed by the central planning body was only limited to the aggregation of the individual projects into sectoral and national plans.

This being the planning procedure actually used in the Egyptian planning design one may expect that the proposed investment projects may not be mutually consistent and balanced or carefully studied in the light of their overall repercussions on the whole economy. The inevitable result that follows, if the departmental approach is the ruling criterion in practical development planning will be a grave balance of payments disequilibrium and a heavy internal inflationary pressure.

It is however for this reason, among others, that Professor R. Frisch has recommended a different approach when preparing an over-all plan. This is because, "Those concerned with industry will of course, want to expand this sector, those concerned with agriculture will want to improve the situation in this sphere, and the educational and health people will want to see their fields expand." (1)

Despite this, Egypt has followed the departmental approach in its planning design. But perhaps this is the usual trend in many of the less developed countries undertaking development plans as Mr. D. Dosser has shown in his article. There he has pointed out that in a great number of less developed countries, most of the decisions on development plans in general and on the question of investment project selection and appraisal in particular are influenced by the bargaining strengths of preconceived ideal and pressure groups. To quote: "A third factor mentioned earlier, which influences the allocation between different investment projects, whether "social" or "productive", is the bargaining strength of existing interests, usually in the shape of

(1) See, R. Frisch, "A Pilot Investment Decision Frame for Egypt", National Planning Committee, Cairo, 1958. (Memorandum No. 18, in mimeograph).

departments of governments or semi-public corporation. Thus if an agriculture department is already strong, a greater proportion than otherwise is likely to be devoted to agriculture whether or not that sector is relatively under-or-over-developed."(1)

Nevertheless, we are still discussing the planning approach in Egypt. The question now is: Is the First Five-Year Plan complete, or is it not complete under this approach? The short answer is that it is by no means complete. We reason for this assertion as follows:-
First, the First Five-Year Plan of Egypt ignores year-by-year estimates when the plan is actually prepared.(2)

Second, it does not include a clear-cut statement of criteria whether for the allocation of domestic capital funds, foreign aid or for the over-all rating of individual investment projects or for the choice between technological variants in the implementation of a particular investment project.

Since the above factors making the First Five-Year Plan to be incomplete are important, in what follows we shall examine each factor in some detail. As regard to the phasing aspect (3) of the Plan, it should be mentioned that the U.A.R. First Five-Year Plan has only

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- (1) See, D. Dosser, "The Formulation of Development Plans In The British Colonies", in The Economic Journal, Vol.LXIX, No.274, June 1959, p.260.
 - (2) Egyptian annual plans have been prepared at a later stage. Uptil now estimates are only available for the years 1960-61 and 1961-62. Reference to these years will be given later on in this chapter.
 - (3) For a detailed discussion of the time perspective in development planning see, W.B. Reddaway, "Phasing A Development Plan", Reprint Series No. 164, Dept. of Applied Economics, University of Cambridge, 196. Also for the same author, The Development of the Indian Economy, 1962, Appendix 13 pp. 197-205. For a more advanced discussion of investment timing see, R. Frisch mimeographed book, Optimal Investments Under Limited Foreign Resources, Oslo Institute of Economics, 1959.

specified capital requirements and output targets for the first and the last year of the planning period. Nothing has been said about the amounts of investment to be spent in each year separately, or the outputs that should be attained in the intermediate years. Although it is intended to provide year-by-year figures later on, the point we stress is that the position in the intermediate years should be examined as part of the Plan preparation.

It is therefore necessary, when formulating a Plan, to take into account the situation in the intervening years and to examine year-by-year figures (covering both private and public sector) in order to test whether the outputs of inter-related items keep in balance each year; the foreign exchange is manageable in each year; the internal resources for investment are matched with the claims in each year and finally to check the degree of progress of implementation.

The problem we have just touched upon is an important one. If the time distribution of input-output coefficients, is carefully worked out in advance, the economy will avoid major bottlenecks. So far as the investment problem is concerned, the timing of investments can be looked at from at least two inter-related angles. First, the time distribution of total investments over the period of the Plan. That is to say how much investments should be undertaken each individual year. This problem involves decisions about starting projects in each year. This in turn should be done in the light of the capital resources which is domestically available or would be available over the years of the plan.

Second, the time distribution of the expected benefits of the project over its anticipated life and within the period of the plan. In considering,

for instance, the capacity (or output) effect of a given investment project, one confronts five dissimilar but interrelated time concepts.(1) These are: (a) the waiting period, i.e. the period during which the project yields no returns; (b) the growing period, i.e. the period during which the yields of the project increases up to its maximum; (c) the stationary period, i.e. the period during which the yields resulting from the investment project is retained at its maximum level (under regular maintenance but no renewal); (d) the declining period, i.e. the period during which the yields of the project is reduced to nothing through wear and tear; (e) and finally the exhaustion period, i.e. the period during which the investment project is retained at its zero-level returns.

The knowledge of the above time concepts is essential and their consideration in plan preparation will avoid many unexpected events. A correct phasing of a development plan for instance will have its effects on the country's net creditor position over time. The table below provides a numerical illustration of the phasing effect of two investment alternatives on the national indebtedness of the country.

Alternatives have been presented in table (13 - 1), alternative I and alternative II. There is no difference between the alternatives but in alternative I project A is started in the first year and project B in the second year; and in alternative II

(1) See, R. Frisch, "Basic Philosophy of National Planning", National Planning Committee, Cairo, June, 1960. Current Note No. 22, p. 13 (Mimio)

project B is started in the first year and project A in the second year. It will be seen from the table that this change in the order of startings has a very profound effect on the national indebtedness of the country. In alternative II, for example, where project B is started first, the net creditor position has been affected adversely in the first year, namely 931 unit as against 445 in alternative I where project A is started first.

If however one has to choose between the alternatives, alternative II would have to rank first. This despite its adverse effect on the net creditor position of the country in the first year. Over time as it appears from the table, the negative effect of alternative II on the national indebtedness of the economy is much less pronounced than if alternative I is the choice (namely (-996) as against (-1835)). In other words, in alternative I the maximum strain on the creditor position is only about one half of what it is in alternative II. This is tantamount to saying that alternative II should be the choice because it has a much shorter consolidation time (1) than alternative I. Clearly, this correct decision have been obtained by shifting the starting years of project A and B. It is therefore, of utmost importance to pay due consideration to the problem of timing in plan formulation.

(1) The consolidation time is termed by Professor R. Frisch to mean the point of time (after the project starting) when the creditor position curve gets back to zero.

Table No. (13 - 1)
Effects of the phasing of two projects
A and B on the net creditor position

		t=1	2	3	4	5	6	7
Alternative	A	-445	-904	-717	-530	-342	-155	+ 31
	B	0	-931	-512	- 92	+327	+746	+1166
I		-445	-1853	-1229	-622	-15	+591	+1197
Alternative	A	0	-445	-904	-717	-530	-342	-155
	B	-931	-512	-92	+327	+746	+1166	+1586
II		-931	-597	-996	-390	+216	+824	+1431

Source:- R. Frisch, Optimal Investments Under Limited Foreign Resources, op.cit., p.50.

So much for the phasing aspect of the plan. We shall turn now to discuss the second factor for which we have considered the first 5-Year Plan to be seriously incomplete. This factor arises from the fact that the investment projects included in the Plan are not reappraised and selected according to a formal investment priority system but as mentioned earlier the Central Planning body has taken it for granted that the decisions thus far made by the individual ministries are enough to justify the inclusion of the projects into the Plan.(1) Going through a great number of individual project description charts I have by no means observed an over-all assessment of priority considerations that will bring out all relationships existing between the projects and the economy as a whole. Furthermore, the quality of project description data would by no means stand the strict judgment of either economic or statistical theory. This is mostly due to the lack of qualified personnel who are capable of producing

(1) See the section on investment priorities later on in this chapter.

well designed specific projects. This in addition to what follows:-

(1) In Egypt, many of the proposed investment projects especially in the industrial field are a legacy from previous plans. In 1956, Egypt has established an industrial plan the main objective of which was to increase the share of the industrial sector in the national income. Some of the already-committed-to projects have not yet been completed at the time when the First Five-Year comprehensive plan has been actually prepared. Hence these projects have to be completed and in the current plan they form the non-decisional part. The same would apply to many of the proposed projects in the agricultural field and the transportation sector such as the High Dam project and the reclamation of the Suez Canal.

(2) The nature of financing some of the investment projects included in the Plan has affected the choice of individual projects.

Typical examples are those projects for which more or less irrevocable decisions have been made in the form of signed contracts or agreements with foreign agencies and governments.

(3) In practice however many of the planners tend to choose investment projects on some "impressionistic" (1) basis irrespective of strictly economic considerations. From a practical point of view however, the weight of opinion strongly favours the

(1) The term "impressionistic" has been introduced by Mr. D. Dosser in his previously mentioned article "Savings and Investment in British Colonial Territories". In that article Mr. Dosser has meant by the term "what the development committee feels is most lacking in the country in terms of standards prevailing in other countries", *ibid*, p.377. Here we use the term to have the same meaning.

(2) See F. B. Redway, "Importance of the Plan for Economic Planning", Reprint Series No. 1, Dept. of Applied Economics, University of Cambridge, 1950, p.

establishment of projects whose output will add to the products which the population needs most whether the need for such products be for direct supply to consumers, or for replacement of imports, or for an increase in exports, or for defence, or for national pride.

If this criterion is the major practical device for investment project appraisal and selection the essential point in practical development planning, asserts Mr. Reddaway, "is to secure a balance in the flow of products year-by-year, and this means that the decisions relate to how much of each type of investment to undertake." (1)

But the amount of investment to undertake cannot be known without the knowledge of the sectoral rate of growth of output. This in turn cannot be known without the knowledge of the productivity of investment which depends on the composition of that investment. Clearly we are facing a serious difficulty over time; the solution of which is by no means possible with behavioural models which are built upon the assumption of constant resources. It is worth mentioning in this connection that the growth problem in general and the problem of investment priorities in particular arises from the need to direct a continuous flow of new resources. The solution of this problem in its dynamic setting involves the use of models which show how the endogenous increase of resources over time is correlated with the utilization of given resources at a given time. It is therefore, necessary if a solution to the problem of investment choices is deemed necessary, to use models which do not assume fixed production coefficients, homogeneous production sectors and equal time perspective for all decision units. This however stems from the fact, as Dr. Ahumada has pointed out, that the problem of investment priorities "arises from the need to direct a continuous flow of new

(1) See W.B. Reddaway, "Importance of Time Lags For Economic Planning", Reprint Series No. Dept. of Applied Economics, University of Cambridge, 1960, p.

resources to the best conceivable uses, including the production of other resources."(1)

Following this line of thought we think that from a social point of view the allocation of resources among alternative uses can only be done in a really proper way with the help of a dynamic inter-industry relation matrix. This matrix should take into account not only inter-industry flows but also relations among different stocks and between stocks and flows.

The use of such models in development programming will provide the planners with an accurate test of the adequacy of available resources and aids in the allocation of investment requirements for the achievement of the desired production levels. Furthermore inter-industry models will provide for individual branches of the economy estimates of production and import levels which are consistent with the estimates of final demand. In addition to the abovementioned uses of inter-industry models one should mention their practical usefulness in checking the over-all requirements of a given development programme against the availabilities of such factors as manpower, foreign exchange, etc. (2)

It may however be argued that these models have also their shortcomings which may belittle their practical usefulness in developing countries where structural changes in form of changes in technology, shifts in the structure of intermediate demand, substitutions of domestic production for imports and the technical substitutability of imports needed for the production of the same commodity; are taking

(1) See, Jorge Ahumada, "Investment Priorities", in Economic Development For Latin America, International Economic Association, 1961.

(2) See Chenesy and Clark, Inter-industry Economics, op.cit.

place. Furthermore these models do not permit the consideration of boundary conditions. In order to overcome these limitations, it is proposed that inter-industry relations have to be formulated in the more general framework of linear programming. This principle however will help the planning authorities in finding the most economical way of achieving a given set of objectives and to determine the efficiency of alternative programmes.

It is not however our intention here to go too far into the technique of linear programming. All what we wanted to make clear in connection with the problem of production techniques and investment priorities is that a linear programming model can help the development planners to include several alternative techniques of producing the same commodity as well as alternative uses of the same resources. Personally I think if one can cope with the difficulties involved in the practical applicability of linear decision models (i.e. uncertainty non-linearities and data problems), the planning authorities through the building-up of a programming matrix and its solution, can find answers to such questions as the respective levels of investment in, and rate of growth of, consumer and producer goods industries, the optimum combination of industries and the maximum rate of expansion which corresponds to the stated goals of development policy.

This approach, if adopted in the preparation of a development plan, will be the more ideal solution to the problem of economic development. But in actual practice it is extremely difficult fully to live up to the ideal procedure. The need for rapid results or the unsatisfactory status of available data may force the planner not to be fully ideal.

It is for this reason among others that the U.A.R. has adopted the departmental approach in its planning design hoping in the recent future to replace the preliminary results as soon as possible by something better. This is however, as mentioned earlier, a common practice in many countries in the initial stages of planning. The experience gained through planning in stages is useful. This is because it attracts public attention on planning and development. Through progress reports which are to be periodically prepared practical difficulties will be emphasized at an early stage. Furthermore, this procedure usually helps in providing a useful framework for budgeting and financial policy.

It is doubtless correct to consider internal consistency of development plans, the time perspective of investment projects, co-ordination and integration aspects of regional plans and the best allocation of both human and material resources, all as the main criteria of effective and rational planning. Therefore it would seem that the procedure of programming so far used in preparing the U.A.R. recent development plans is by no means the best technique for optimal development programming.

3. On the size of the First Five-Year Plan:-

With regard to the total size of the U.A.R. First Five-Year Plan it can be recalled from the previous chapters that Egypt has to save about 21 per cent of its national income by the end of the fifth year of the first planning stage. This is necessary if the planned investments are to be matched with the financial resources which are to become domestically available.

At first sight, it appears, that the task is too great for the government of the U.A.R. and the Egyptian population. In a country like Egypt, where the initial level of per capita income is low and the marginal propensity to consume is high it may be difficult to achieve the planned rate of savings without further restrictive consumption measures. In other words without austerity and ploughing back a considerable part of the benefits that would arise from the development plan, the desired rate of savings may not be attainable.

Of all the more considerations in this connection is the fact that the saving's rate is itself basically dependent on the policy that is to follow. Hence, it is by no means subject to target setting. Econometricians who have tried to derive an "optimum saving programme" from the simple maximization of instantaneous utility have not reached clear-but clues for this problem. (1)

For instance, Professor J. Tinbergen has pointed that all answers obtained on this question "do not enable us to choose between the practice followed in communist and non-communist countries, ^{for} in a way they are "plus communistes que les communistes". (2) Furthermore, Professor Tinbergen has attracted our attention to what is really missing in optimization theories. This can be specified in two ways. One, is to introduce a perspective discount co-efficient. The other is to refer to the "need for continuity" or to the distribution over generations.

In practice, the first method has been avoided because, if a time discount governs individual decisions, it should not govern

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- (1) See, J. Tinbergen "Optimum Savings and Utility Maximization Over Time", Econometrica, Vol.28, 2 (April 1960). pp.481-490.
 (2) Ibid, p.488.

a nation's decisions. Even if a time discount is accepted in national planning, its value can only be arbitrarily assigned.

Now, with regard to the distribution of utility over generations it should be pointed out that in each consecutive time, a different generation is living. Any attempt to postpone consumption means allocating it to the next generation. As Professor Tinbergen has pointed out, "the feeling of utility at any moment depends not only on the consumption of that moment but also on consumption in other time periods." (1) This raises the problem of balance between the consumption levels of consecutive generations.

The concern of balance, in turn, raises the more difficult problem of equity versus maximum growth in output over time which may be difficult to attain. On the other hand, if complete equity is the high ranking criterion, maximum growth in output over time may be something difficult to attain. On the other hand, if the desired balance is in favour of growth, complete equity is unattainable. Finally, if a compromise between equity and maximum output is practically desirable the solution depends on the relative weights given to both utility and equity.

Having said this, one may ask: Why not a less developed country plan for "full potential growth".

On this question Mr. B. Horvat (2) has suggested that each country has to exploit its growth potential to the fullest. Sooner or later the country will find if its plans overreach this potential or not. If the findings are positive, the country will

(1) Ibid, p.489

(2) See B. Horvat, "The Optimum Rate of Investment", Econ. J., December, 1958, pp.747-67.

be well advised to cut back. On the other hand, if the plans underreach the country's growth potential, the country should push up its investment rate.

Horvat's investment production function is a function of the level of initial investment, the absorptive capacity of the economy and the speed of their expansion. Symbolically this can be expressed as follows:-

$$P = F \left[I, \frac{dI}{dt}, A, \frac{dA}{dt} \right] \quad (1 - 1)$$

where P stands for the investment production function;
 I stands for gross investment net of replacement;
 A the absorptive capacity of the economy, and;

$\frac{dI}{dt}$, $\frac{dA}{dt}$ = rates of expansion of I and A over (t)

Alternatively equation (1 - 1) can be rewritten as follows:-

$$p = f \left[I, \frac{dI}{dt}, g \left(C, \frac{dC}{dt}, H, \frac{dH}{dt}; \right. \right. \\ \left. \left. Kn, \frac{dKn}{dt}; O, \frac{dO}{dt}; E, \frac{dE}{dt} \right) \right]$$

Note, that g is a function of four basic policy variables, their rates of change, and a given factor E and its rate of change $\frac{dE}{dt}$. As regards the policy variables we have

C = consumption;

$\frac{dC}{dt}$ = the rate of change of consumption over t ;

H = health;

$\frac{dH}{dt}$ = the rate of change of health conditions over t ;

Kn = knowledge;

$\frac{dKn}{dt}$ = the rate of change of knowledge over t ;

Finally, Horvat has derived his optimum investment production function as given by the formula.(1)

$$P_{opt.} = F(I(A))$$

Accordingly, the optimum rate of investment which can be productively applied is limited by the community's productive absorptive capacity by which is meant, "the ability of individuals and of the society as a whole to manipulate the stream of output increments." (1)

That the upper limit of investment is fixed by the absorptive capacity of the economy is something of great economic value. If the country plans to invest more than that limit, the planning mechanism breaks down, bottlenecks develop. Furthermore, timing becomes too critical, the labour force becomes unable to operate, structural changes becomes also too great, and finally the need for innovational management outruns the potential supply of this talent in the population.

On the other hand, if the economy is to plan within the limits of its absorptive capacity, the gain of output resulting from the increase in investment will be so great as to outweigh any near-term losses.

Horvat, however, thinks that for many underdeveloped countries, the maximum rate of investment is about 30 per cent. This rate in turn can yield a rate of growth of output of 10 per cent or more per annum.

Horvat's rate of investment and growth confirms the desired rates of growth in the United Arab Republic. The general aim of

(1) See, Horvat, op.cit., p.753.

economic development there, is to double the net national product in ten years time. To achieve this rate, Egypt has to invest not less than 30 per cent of its national income, given a capital-output ratio of 3.

Whether the country is capable to increase its savings rate from what it is now to the desired level compatible with growth targets is something difficult to decide at the present. But if the people are willing to accept further sacrifices for the sake of future growth, the saving rate may rise. If the country adopt policies aiming at reinvesting most of the surplus that is to emerge from the various investment projects, the saving rate would also rise.

On the other hand if the marginal disutility of savings is not zero, no existing economy (asserts Dr. A.K. Sen) should follow Horvat's maximum growth path save for the case where growth is the overriding objective of economic policy for its own sake. (1)

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- (1) See, A.K. Sen, "On Optimising the rate of saving", E.J. September, 1961, p.486. In this article Dr. Sen has shown that once the specificity of productive capacity is recognised to have an important bearing on the question of choosing future rates of savings the problem of optimising the rate of saving becomes equivalent to the problem of sectoral investment allocation. To the extent that this is true, we have to think of the problems involved in the determination of the optimum saving rate not only as questions concerning the allocation of consumption between present and future generations, or between near and distant future, but also as problems of allocating consumption between different generations in the future. The latter question becomes the more important, the longer is the time period required for the execution of saving decisions as given by gestation lags and production specificities. To what extent is Dr. Sen transgressing the limits of economic services is something to be seen perhaps in the field of ethics or political choices. For a detailed discussion of Dr. Sen views on the question of intertemporal allocational problems, the reader is referred to the above mentioned article.

This is because "the choice of maximum growth implies that the marginal disutility of saving is zero."(1) That this condition is difficult to achieve in the very short run needs no further proof under the prevailing conditions of many of the newly developing countries. Granted this to be true one may think of Horvat's maximum growth path as a very long run policy. In the far distant future, savings from incremental income may be achieved without further sacrifices.

However, if the preceeding argument is to be reduced to a statement of instructions to development planners, the following statement will suit the purpose in hand.

"..... a meaningful set of instructions to development planners may be to plan for maximum growth, to seek out all genuine investment opportunities, but also to make sure that the human, technical, intellectual and organizational resources are sufficient for the plan. Whether conflict with other economic objectives, such as price stability, equity in the distribution of income, or balance in the international accounts will in fact arise is something to be determined only after the investment potential is explored. And in the event of conflict, one might argue that fiscal, monetary, and foreign borrowing policies must then be devised which reduce the conflicts without leaving the country depart very far from its full potential growth path."(2)

(1) See, Horvat, op.cit., p.767.

(2) The above quotation summarises Mr. Horvat's views as interpreted by Professor Otto Eckstein. For reference see, Otto Eckstein, "Capital Theory and Some Theoretical Problems in Development Planning", in the Amer. Economic Review, Vol.LI, May, 1961, No.2, p.95.

As far as the U.A.R. is concerned we think that planning for maximum growth potential may be useful provided that the human skills and the other complementary facilities are sufficient to cope with the required maximum. On being practical I would say that each country should plan within its underlying structure if it is to avoid potential bottlenecks. That is to say the plan should be consistent with the country's resource availabilities and potentialities.

It however can be recalled from the previous chapter that the money value of the fixed capital assets required over the next five years to undertake the proposed investment projects comprising the first 5-Year Plan, is estimated to be L.E. 1577 millions (excluding the value of the changes in stocks). Out of this amount, about L.E. 646 millions is required in foreign currencies.

By way of comment on the abovementioned figure we would say that the Plan underestimates its overall size in terms of foreign exchange requirements for at least two main reasons

First, the amount of investible capital required in foreign exchange may not accurately represent the actual needs for the implementation of the proposed investment projects. The reason is because these figures do not account for the indirect imports needed by the domestic sectors of production in order to be able to make the deliveries to the proposed investment projects. In this case it is quite probable that the estimates of foreign exchange requirements do not give an accurate information about the foreign indebtedness side of the Plan. It is therefore necessary to take into account the various indirect inputs

needed for the establishment of the proposed investment programme. But as Professor Frisch has pointed out in the course of analysing the Edfo Sugar project in Egypt, "It will be readily recognized how utterly impossible it is to describe such effects adequately without a well worked out technique of overall national planning."(1)

It is therefore quite obvious that the Egyptian Plan underestimates its size in terms of foreign exchange requirements owing to the implicit neglect of the indirect input needed by the domestic production sectors. If an estimate for these indirect imports is to be made the foreign exchange component of the Plan will increase. This in turn means a further disequilibria in the balance of the international balance. In other words the burden of foreign finance will be augmented and the re-settlement of the debt and its services becomes serious.

The second point for which we think that the Plan underestimates its size stems from the fact that the estimates for foreign exchange thus far made are converted into local currencies at official exchange rates prevailing in the year 1959/60 without taking into consideration the under or over-valuation of the currency. As we have already pointed out the official foreign exchange rate may not reflect the true value of capital costs needed for the implementation of the proposed investment projects. It is therefore necessary to recompute all imported elements in the cost of the investment using an equilibrium rate of foreign exchange. The same would apply to any part of the output which is to be exported. If this is to be done, the foreign exchange component of the Plan will increase and this in turn will

(1) See, R. Frisch, "Why National Planning", Current Note No. 17, (mimeographed), National Planning Commission, Cairo, 1960.

add to the burden of foreign finance.

This however, is not the whole story. But we have still to consider whether the over-all financial resources which are at the present available match with the planned investment or not? Granted the estimates thus far made for the capital requirements and neglecting for the moment domestic finance in local currencies; table (13 - 2) shows what is now available in terms of foreign currencies. From this table it can be noticed that Egypt has succeeded to obtain up till March, 1961 about L.E. 444 million. If this figure is compared with the figure which represents the amount of capital required in foreign exchange (i.e. L.E. 646 m.), it will be readily noticed that Egypt is still in need of further foreign exchange if its investment programme is to be implemented. The gap between foreign exchange requirements and foreign exchange availabilities will be widened if we include a value for indirect input requirements and the under-priced foreign exchange rate.

Table (13 - 2)
UAR, (Egypt) - Availabilities of
Foreign Loans and Credits by Type of Donor

Country	Value (L.E. m.)	%
Western Countries	121	27
Eastern Countries	218	59
U.S.A.	68	15
Japan	17	4
World Bank	20	5
Total uptil March, 1961	444	100

Source: Adapted from: Dr. M.A. Ajamia, "Some Economic Aspects of Investments in the UAR", University Studies in Arabic, The Economic Ahram, No.139, Cairo, June, 1961, p.26.

So much for the foreign exchange component of the first 5-Year Plan of Egypt. Let us now briefly examine the demand for and the supply of domestic finance. Available data on this point will only help us to consider the situation in the year 1961 - 1962.

Table (13 - 3) shows that the estimated savings of the public sector is by no means sufficient to cope with investment requirement. Whilst savings amount to L.E. 79.3 millions; investments amount to L.E. 295.7. The deficit is about L.E. 216.4 million.

The question now arises: From where the public sector is to get the means of finance? The answer of this question according to the planning experts in Egypt can be derived from the above-mentioned table. From that table it can be deduced that the public sector relies heavily on the savings of the private sector. This is evident from the fact that whilst the savings of the private sector is estimated to be L.E. 227.7 million in 1961-62, the investments which this sector is permitted to undertake amounts only to L.E. 67.2 million in the same year. Hence a surplus of about L.E. 160.5 millions is to be challenged into the public sector through intermediate financial institutions.

The point however we would like to emphasize in this connection is this: From where the public sector will get the finance needed if the savings of the private sector are not going to be materialized for one reason or another?

Table (13 - 3)
 UAR, (Egypt) - Planned investments and
 savings, 1961 - 1962.

	Savings (L.E. millions)	Investment (L.E. millions)	Overall Surplus or deficit
Public sector	79.3	295.7	-216.4
Private sector	227.7	67.2	+160.5
Rest of the world sector	55.9	-	+ 55.9
Grand Total	362.9	362.9	-

Source: Adapted from estimates prepared by the National Planning Committee, Cairo.

Having reached this stage of our investigation into the total size of the first 5-Year Plan of Egypt and the problem of financing the proposed investment projects we would like to conclude that the Plan underestimates its size in terms of foreign exchange requirements and overestimates it in terms of domestic and foreign resources at the present available. If however, domestic finance or foreign exchange is not to become available over the years of the Plan as anticipated by the planners; the proposed investment projects may not be fully implemented and hence the production targets in general and those for industry in particular would not be realized.

4. On the Composition and Distribution of the Planned Investment Programme:-

Given the total size of the First Five Year Plan we turn now to discuss in some detail its composition and the basic considerations thus far used in allotting investment priorities. It would appear

from the over-all investment programme (1) as illustrated in table (12 - 18) that the Plan is designed to enable the country to advance simultaneously in agriculture, industry, and other impulse sectors as well as in social services. This is tantamount to saying that the Government of the U.A.R. is aiming at a balanced pattern of economic growth while at the same time giving first priority to the industrial sector.

It will be useful, however, to distinguish the role of the public sector in the development of the economy and the type of activity that is planned to be produced within the domain of this sector. Table (13 - 4) shows that in Egypt the public sector is to undertake about four fifths of the total size of the first year of the Plan.

Table (13 - 4)
UAR, (Egypt) - The Planned Distribution of Investment by
Type of Investor in 1960 - 61 and 1961 - 62.

Year	Sector	Public Sector		Private Sector		Total	
		(L.E.Mill)	%	(L.E.Mill)	%	(L.E.Mill)	%
1960-61		239	81	56	19	395	100
1961-62		296	82	67	18	363	100

Source: Adapted from data prepared by the National Planning Committee, Cairo.

To invest the above classification with meaning it will be useful to examine the type of activity to be undertaken by each type of investor. Few however will argue that governments in general should be concerned primarily with education, health, public utilities and the

(1) See the appendix to the previous chapter.

similar activities coming under the pressure-relieving category. It is also unquestionable that governments should create the political and economic climate which will attract private capital and help productive enterprise to flourish.

As regards the U.A.R. case, the present practice clearly shows that the Government besides the development of the country's social overheads, the public sector has taken the responsibility of raising the productive capacity of the economy. As it will be seen from the table below, the share of the public sector in what we have termed productive investments exceeds the share of the private sector. Such is the case with the other types of investments except for item (d) in table (13 - 5) where the private sector's contribution to the development of the housing sector exceeds that of the public sector.

Table (13 - 5)
U.A.R. (Egypt) - Planned Distribution of Investment by
Type of Investor and Activity
(1960 - 1961)

Sector	(1)	(2)	(3)=(1)+(2)	(4)=(1)+(3)	(5)=(2)+(3)
	(L.E. millions)			Percentages	
Activity	Public Sector	Private Sector	Total Outlay	Public Sector	Private Sector
(a) Productive Investments	122	26	148	82	18
(b) Impulse Investments	83	8	91	91	9
(c) Social Investments	20	1	21	95	5
(d) Residential Buildings	14	21	35	40	60
Total	239	56	295	81	19

Notes:-

- (a) Productive Investments include planned development expenditure on agriculture, irrigation, drainage, industry and electricity.
- (b) Impulse Investments cover investments in communications, transport and public utilities.
- (c) Social Investments cover medical services, education general administration and other social services.
- (d) Residential Buildings does not include buildings attacked with internal security or general administration.

Source:-

Compiled and reclassified from detailed estimates made by the National Planning Committee, Cairo. For further details see: United Arab Republic (Egypt), National Planning Committee, The Detailed Estimates of the First Year of the Five Year Plan for Economic and Social Development, July 1960 - June 1961 (in Arabic).

If, however, we enquire into the reasons making the Government of the U.A.R. intervene heavily in the development process, the following motives become apparent.

First, the need for introducing structural changes whether in the basic occupations of the civil labour force, in the structure of foreign trade, or in the way of supply goods and in the commodities to be supplied, makes it essential for the government to adopt direct methods of control aiming at putting the reins of the economic system in the hands of the public sector. In Egypt, for instance, the Government have complete control of the banking system and the foreign trade (especially the raw cotton trade). All private banks and insurance companies were nationalised. This in addition to many of the private industrial, financial and commercial firms.(1) Practically, most of the economic activities in Egypt are now under semi-government ownership through the participation of the public

(1) See, National Bank of Egypt, Economic Bulletin, Vol. XIV, No.2., Cairo, 1961, p.119.

sector by 50% in their capital. The recent action of the Government can be interpreted by the following motives: (a), through applying a tighter control of foreign trade, the Government can reduce the balance of trade's deficit. (b), in order to channel the profits arising from these activities into the public sector so as to increase the supply of resources needed for financing the development programme.

Second, the Government is aiming at the development of the agricultural sector both horizontally and vertically. Horizontally by the establishment of major irrigation projects such as the High Dam project. These projects have been considered as the only possible way through which the cultivated area can be expanded and the severe fluctuations arising from climatic conditions can be stabilized. For instance, the High Dam project in Egypt, if completed, (1) will raise the irrigated area by 1.3 million feddans, permit the conversion of about 670,000 feddans of basin irrigated land to perennial irrigation and increase the agricultural yields by improving drainage facilities and by stabilizing the supply of water from year to year. This in addition to the vast benefits arising from the electric power, (2) flood protection and navigation aspects of the project.

Vertical expansion includes the introduction of selected seeds, protection of plants and animal wealth, diversification of products and

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- (1) The foundation stone of the High Dam project was laid on January 9, 1960. Work is now in progress.
 - (2) The Hydro-electric power to be derived from the High Dam will amount to some 10 billion KWH or about six times the energy now generated in the Egyptian Region of the U.A.R.

improvements in production methods. It is therefore of utmost importance to undertake agricultural projects aiming at increasing agricultural output. But of more concern to us is that these projects are beyond the financial means of the private sector. Hence it is not surprising to find that they are considered as they used to be in the past, a public responsibility.

But even if all these projects are to be undertaken, agricultural production will not be sufficient to cope with the required expansion in the standard of the growing masses of population. It is therefore, the public sector's responsibility to look after the development of the industrial sector in order to improve its productivity and to enlarge the industrial base of the country through the establishment of new industries.

Government intervention in this productive sector of the economy was considered as something desirable in the Egyptian case. This is because industry under the private hands was not established on sound economic grounds. From the history of the industrial development in Egypt one can find many examples justifying this assertion. In the textile industry, for example, the uneconomic use of raw materials has placed this industry in an unfavourable position. The use of Egyptian cotton to produce thick fabrics instead of producing fine fabrics was one of the basic factors raising the prime cost of the textile industry.

This in addition to the low levels of technical skill and know-how. Consequently the productivity of the Egyptian worker was always lower than that in other countries. In 1947, for example, the productivity of labour in industry as a whole in Britain was 3.6 times as great as that

in Egypt. In the U.S.A. it was 8 times and in Germany it was 4 times.(1) These figures, though they do not represent the level of the value of output per operative in the more recent years, do indicate that Egypt before the era of national planning and government direct participation in the development of the industrial sector was industrially under-developed and her resources were not fully and economically utilized.

This was the situation of the Egyptian industries when it was under the private hands. In this connection however we would like to quote Professor G. Said who has conducted an empirical study of the Egyptian industry and reached the conclusion that, "If we visualize the combined effects of all factors: uneconomic utilization of materials, low productivity of labour, inefficiency and high costs of fuel, low utilization of capacity, very high overheads, inflated proportion of directors' and administrative costs, and high distribution costs, etc., we can easily come to the conclusion that nearly all, if not all our industries operate at a disadvantage." (2)

For the above reasons among others the public sector has participated in the development of industry in order to achieve a self-sufficient economy by replacing imported products domestically consumed by those produced locally and to expand export industries for which market conditions are favourable. But this has not to be taken to mean the gradual elimination of the private sector and the

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- (1) These figures are derived from a comparative study prepared by Pr. G. Said. For reference see, G.E. Said, "Some Aspects and Problems of Industrialisation in Egypt with Special Referenct to Problems of Finance", (Mondiale Press), Cairo, 1958.
- (2) See G.E. Said, *ibid.* p.94. See also his Economics of Egypt and his article published in the Economic Bulletin of Bank Misr, July 1956, entitled Study and Analysis of Comparative Efficiency in Egyptian Industry.

neglect of the more relevant activities to the public sector. On the contrary, the aim was only to channel the country's resources from undue investment emphasis on the much more profitable but unproductive activities in real estate, import and other speculative activities to more productive activities that will supply the whole economy with its basic input requirements such as chemicals, iron and steel products, cement, fuel, fertilizers or other consumer goods.

5. Determination of Investment Priorities in the Plan:-

In searching for actual methods so far used in assigning investment priorities among individual investment projects comprising the development programme or among the various sectors of the national economy; we have faced a serious difficulty in knowing fully what the practitioner in development planning and those who are responsible for investment project design and appraisal, have in mind when a certain decision has been taken with regard to a particular investment project or a specific sector of the economy. Faced with this difficulty combined with the lack of published information on the subject matter of this section, the following general considerations are those which one can deduce from both personal discussions and available information on the question of investment priorities.

So far as Egypt is concerned, first priority has been assigned to the industrial sector. This is because a faster rate of growth under the present economic conditions of Egypt can best be achieved through the expansion of the industrial sector. The development of this sector will also help Egypt to achieve the required balance in its international balance of trade. This is because once new production is to appear in the domestic market, the country will save foreign

exchange through the substitution of goods which had to be imported. This in turn will reduce the deficit in the balance of trade. Furthermore, through the expansion of industrial products for which there is a market for exports, the country will increase its foreign exchange earnings and hence its capacity for further imports. All in all, industrial development contributes to the achievement of a rapid growth in net national products as well as to the creation of skills and experience .

Second priority was given to the transportation, communications and storage sectors. This in turn will help Egypt to develop further the infra-structure of its economy. Third priority was allotted to the agricultural sector and its related activities. This also reflects the determination of the present Government to expand the basic structure of the national economy. The social activities centre ranks fourth or bottom in the scale of priorities. This in turn sheds some light on the route Egypt has decided to follow in its earlier stages of economic planning. That is to say that during the First Five-Year Plan the development of the directly productive sectors have had precedence over the social development sectors.(I)

Table (I3 - 6) statistically demonstrates the previously mentioned priority considerations. Furthermore it sheds some light on the types of activity in which both the public and private sectors are to allocate the development outlay. The table shows that

(I) Following A. Hirschman we distinguish the social overhead capital by these five criteria : (a) It provides services in some sense basic for many activities; (b) It is supplied in practically all countries either by the public sector or by the private sector under control; (c) It cannot be imported; (d) It is indivisible; and (e) It has a high capital co-efficient. (See A. Hirschman (86), pp.83-4

Table (I3--6)

UAR, (Egypt) - Percentage Distribution of
Total Investments, 1961 - 1962.

Major Heads of Development Sector	Public	Sector	Private	Sector
	%	Priority order	%	Priority order
- Agriculture, irrigation, drainage and the High Dam	20.1	3	9.1	4
- Industry and Electricity	33.7	1	23.1	3
- Transportation, Communications, storage and the Suez Canal	27.3	2	3.5	5
- Dwellings	5.8	5	40.6	1
- Public utilities	4.7	6	-	
- Services	8.4	4	23.8	2
Grand Total	100.0		100.0	

Source of basic data:- National Planning Committee, Cairo, 1962.

whilst the public sector invests more than one half of its total investment in industry and transportation; the private sector of the economy has followed its traditional pattern. About 40% of its total investment in 1961-62 is allocated in dwelling. It is for this reason among others the share of the private sector in total investments is declining over the planning period.(1)

By way of comment on table (13 - 6), we would say that despite the fact that Egypt is planning to achieve a balanced pattern of growth; the figures shown in that table clearly illustrate a deliberate sectoral

(1) Compare these figures for the private sector:-

1960-61 19% of planned total investment
1961-62 17% of planned total investment

imbalance in the sectoral distribution of the planned investment programme. The first sign of imbalance is that between the private sector and the public sector. But this is not a serious one as previously explained while discussing the size of the Plan and its composition. This does by no means imply the continuation of this imbalance. On the contrary the private sector has by all means to be encouraged to participate in the development process provided that its savings are not to be dissipated in unproductive types of investments.

The second sign of sectoral imbalance appears from the share of the services sector in the total investment. It is this sectoral imbalance that may contradict with the more required adjustments in the social structure of the country. The writer however has not considered it to be his task to make an extensive study of the social ills of the country. Suffice it to say that in a country plagued with a high rate of illiteracy and inadequate social welfare, it is by no means possible to achieve higher rates of material production without a corresponding increase in the power of the population to perform their tasks efficiently and willingly. It is only through the improvement of health, education, social welfare and housing, labour and manpower training, that the citizens can become skilled and productive, properly imbued with civic consciousness and a healthy nationalism.

The planners and the policy makers in less well-off countries ought to remember that economic development does not take place in a vacuum and the production of wealth occurs in a dynamic complex of inter-locking social forces. Since it is the public sector's responsibility to provide the growing masses with the basic requirements for social advance, social

development must by no means have a low rank.

Of more concern to us is the question: How is the distribution of investment between productive and social sectors determined, and what are the selective norms determining the choice of individual projects within each category?

As thus far mentioned the allocation of public investment expenditure to and within the social category was made on the basis of subjective judgment rather than objective measurements. This may be due to the nature of these activities where no direct economic return can be assessed in quantitative returns. Social services as well as the various imponderables being by definition not amenable to quantitative measurement, their repercussions on the whole economy can only be assessed by subjective opinion.

In other words, the final decision on activities having an intangible benefit has to be taken by a group of wise men capable of appraising the imponderable implications according to the pre-assigned aims of development policy. Clearly, preference coefficients have to be the ruling factor in determining the scale of priorities among Government investment in health, education and the similar activities where the return is next to impossible to measure in objective quantitative terms. These preference coefficients can be fixed by a suitable formulation of dichotomic questions.(1)

It would be tempting to write at length on the nature and the technical assessment of preference coefficients and interview techniques. But we shall

(1) For a technical discussion of this problem see, R. Frisch, "Numerical Determination of a Macroeconomic Preference Function", Memorandum No.11, of 10 January 1958, National Planning Committee, Cairo, Egypt. Also for the same author: "Practical rules for interview determination of one-sided and two-sided preference coefficients in macroeconomic decision problems", Oslo Institute of Economics, 25 June 1959.

resist this temptation by suggesting some of the general factors that may be taken into consideration in determining social priorities. These however are:-

1. Projects the implementation of which would improve the living conditions of the people and their level of productivity should be given first priority. This is because in Egypt, the prevalence of low standards of health, bad housing conditions and illiteracy are some of the factors accounting for the low productivity of labour.
2. Projects the benefits to be derived from which affect the greater bulk of the population should receive preference over those^e projects affecting only a limited segment of the population.
3. Projects the undertaking of which does not only unduly retard or reduce financial resources available for direct production or impair development in other economic sectors, should receive priority over others.

Now, as regards the principles so far used for assigning investment priorities among what we have considered as directly productive investment projects we have found general considerations rather than quantitative priority systems. Though not explicitly stated in the official first ^{Five} 5-Year Plan drafts, the following factors are those regarded in drawing up the over-all investment programme.

In the sphere of agriculture, first priority was assigned to projects aiming at expanding the horizon of the cultivated area. Second priority was allotted to export products and to those projects providing raw materials necessary for the expansion of manufacturing activity and for the replacement wherever possible of currently imported raw materials. Third priority was given to those projects attaining self-sufficiency in food items.

In industry the following scale of values are those thus far considered by the Ministry of Industry for giving priorities among individual investment projects:-

- (1). As the main objective of economic development in general and industrial development in particular is to increase the level of national income, hence one of the considerations in allotting priorities to projects was the extent of increase in national income which would accrue from each investment. On calculating the income resulting from the implementation of the industrial programme, an investment multiplier was valued at "3".
- (2). In addition to the abovementioned basic principle there were other considerations thus far used in the allotting of industrial priorities. These however are: the cost of each project, particularly the sum needed in foreign currency; the extent to which the project would utilize locally available resources; the period necessary for the execution of the project and the extent of the employment by the project of locally available resources, in particular raw materials available in abundance, unskilled labour and local by-products.
- (3). Furthermore there were also some strategic considerations for which special priority was assigned to specific projects regardless of their proper order in terms of the foregoing considerations.

It is however worth mentioning that so far as the industrial sector is concerned absolute priority was given to strategic and basic industries on which existing industries depend and to those projects the products of which pave the way for the establishment of new industries, and because of the scarcity of foreign exchange high priority was given to foreign exchange - saving and foreign exchange - earning projects.

The essential point is that no systematic priority system has been used for measuring the quantitative significance of the abovementioned considerations or showing up the relative weight that is to be given to each objective. Nor all the projects included in the industrial programme were appraised and selected according to the over-all effects of each individual project on the national economy. As mentioned elsewhere in this study individual ministries in proposing or selecting investment projects in their own sphere have completely neglected the various interdependences among the projects scheduled for implementation. This however is a serious defect in the whole planning procedure and it is the responsibility of the Central Planning Committee to reappraise the proposed investment projects before including them in the comprehensive development plan.

6. Tentative conclusion and recommendations;-

From what we have been discussing in the foregoing sections of this chapter it would be rash to draw concrete conclusions. The general impression of the writer however, is that although the United Arab Republic has succeeded in putting the national economy on the road of planned economic and social development through national planning and government steering; its recent First Five-Year Plan has by no means reflected many aspects of effective and rational economic planning.

The Plan basic approach appears to be comprehensive in form, partial in concept, incomplete in formulation. The total size of the Plan as measured by the over-all investment programme, may be ambitious in terms of non-inflationary methods of finance and non-availability of domestic savings, foreign loans and grants. The composition of the investment programme and its priorities, though reflecting the future developmental

needs of a growing economy like Egypt in the verge of transformation, may lack systematic individual project appraisal and comparison.

The achievement of the anticipated output, income and employment targets depend on the actual implementation of the proposed investment projects at the planned time and within the estimated cost. Since this is something which remains to be seen, no conclusions can be stated in advance. It is sufficient, however, to assert that it is only a plan the success of which is a function of both economic and non-economic factors. If it is possible to assess the impact of the first group, it is by no means possible to predict accurately the repercussions of the other factors including climatic conditions and external disturbances. The success of the Plan may be once again a function of the degree of political independence the planners possess in performing their tasks; the quality and quantity of administrators and planners who do believe in what they are supposed to do and finally the available or would-be available economic resources by the means of which predetermined goals are to be achieved.

Given all the other factors over which the economy has no control, we strongly recommend the intensive use of economic criteria in plan preparations. Following H. Chenery, R. Frisch, J. Sandee and E. Holland (1) we reason for this assertion as follows:-

The use of economic criteria is likely to improve the formulation of development plans in general and the making of projections and the appraisal of policy alternatives in particular. In this way governments may avoid in advance the establishment of overly-ambitious investment

(1) For references of the work of the abovementioned authors see our selected bibliography on Investment Criteria And Related Topics included in this study.

programmes which would cause major bottlenecks such as inflation and balance of payment difficulties.

What analytical device one may suggest for planning the general rate of economic and social advancement is a question whose answer depends upon the statistical data available, and the structural adjustments in the economic system desired. Where the structure of the economy is bound to change over time, dynamic linear or non-linear programming procedures would be the most relevant analytical technique to use. Where nonlinearities, discontinuities, irreversibilities and time delays come into the way of linear programming techniques, the technique of simulation can be used to study problems of economic development for developing economies. This technique in brief will help development planning designers to establish a constant and technically feasible development plans and to explore the effects of changes and alternatives in such a plan.

Furthermore, it will help in discovering what variables provide the best signals to tell how well the plan is succeeding or to warn of impending trouble. In addition, simulation studies will help in discovering what side effects are likely to be induced by any given policy and finding out how to cope with such effects if they appear. Finally, these studies make it possible to observe the dynamic interaction of aspects of the economy that are usually analyzed in isolation from each other such as investment decisions the subject matter of the present study.

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It however may be argued that the use of operational research techniques in the fomulation of development plans may facour^v mechanistic types of projections and may also be more elaborate than the existing

body of statistical data in the present-day developing economies warrant.

In this connection it should be mentioned that the present day-to-day experience of Egypt with the actual application of programming techniques in general and the input-output method in particular (1) has demonstrated the following facts about the Egyptian Economy:-

- (i) The basic statistical information needed for the construction of an input-output table were dispersed rather than scarce.
- (ii) There is a substantial interdependence among the production sectors despite Egypt's heavy reliance on imports. The empirical evidence is this: Out of the 1056 cells included in the production matrix of the 1956 table, 542 contained entries for domestic production. Furthermore, in 1954 deliveries from domestic production to intermediate consumption were L.E. 847 m. as against L.E. 1007 m. delivered to final demand.
- (iii) The frequency of changes in the coefficients are likely to be great over time because of the establishment of new industries, the substitution of domestic production for imports, the adoption of new techniques in place of the old and the rapid change in the future composition of output.

Even if this is the case in many of the less developed countries: we will call for sound economic judgment as well as for further improvement of the quality and quantity of the available statistical information. Through the application of economic models the weaknesses in the available statistics come into light and this makes the continuous improvements of them an obligation for both producing and consuming authorities.

(1) For further details see G. Eleish, "The Input-Output Model in a Developing Economy: Egypt", in Barna et. al., Structural Interdependence And Economic Development, (Macmillan & Co. Ltd., 1963), pp.199-220

CHAPTER XIV

INVESTMENT CRITERIA: POSSIBILITIES

OF APPLICATION AND STATISTICAL

PROBLEMS OF IMPLEMENTATION.

"Weighing the costs and gains of alternative actions is the correct way to look at problems of choice". R.N. McKean (Scottish Journal of Political Economy, Feb., 1963, p.35).

CHAPTER XIV

INVESTMENT CRITERIA : POSSIBILITIES OF APPLICATION AND STATISTICAL PROBLEMS OF IMPLEMENTATION

Bearing in mind Lord Keynes' dictum "Without theory we are lost in the woods", we contend that the theoretical investment criteria expounded earlier in this study are relevant in the selection of investment projects, programmes and plans(1). This is one of the main themes of this chapter, despite the fact that none of these criteria have been applied in working out the First Five Year Plan of Egypt, for reasons having to do with the present conditions of the Egyptian Economy and the quality of the project description data.

Granted that there are many conceptual and operational difficulties in giving quantitative precision to these criteria and that various qualifications and rough assumptions have to be made in applying them to actual cases. I think that, as guides to investment planning decisions, they are much better than ad hoc methods of allocation currently in practice.

The result is that the more the Egyptian Economy is planned to achieve defined objectives, the greater will be the need to apply economic criteria to the various investment decisions that have to be made. The 'best' investment plan for Egypt is that

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- (1) It should be mentioned here that wherever I have used these terms in this study I have meant by the term project the smallest unit of investment activity that can be carried out independently of other projects. An investment programme is a co-ordinated set of projects. An investment plan is an integrated set of programmes.

which achieves the accepted objectives of development policy subject to the constraints of scarce resources and time.

An attempt is made in this Chapter to justify the position we have just described by considering the following questions connected with the theory and practice of investment criteria.

These are:-

- (a) Has the discussion of investment criteria produced any enlightenment so far as Egypt is concerned?
- (b) Assuming that one or other criteria were to be tried out in Egypt, which one would be most suitable?
- (c) Are there further statistical problems of implementation not dealt with in the preceding sections of this study?

As far as the first question is concerned, mention has already been made of the fact that various public ministries and private organizations have been requested to prepare detailed memoranda on each project proposal. This was done whether the project is a new plant, an extension of existing facilities or an improvement of old schemes. Although the questionnaires used provide data (mostly in physical units) they do not reveal the criteria constituting the bases on which projects will be accepted or rejected.

To check the consistency of the Plan, use was made of commodity balances(1). But careful examination of this method calls for

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- (1) For the use of material balances in development planning see Montias, J., "Planning with Material Balances in Soviet-type Economies", American Economic Review, 1959. Although the formal structure of a commodity balance system is similar to that of an input-output model; commodity balances can only be computed for rows and not for columns. Furthermore, the calculation is usually carried out in physical terms and the input coefficients may be measured either as a ratio of physical units or as a ratio of physical input to value of output.

reconciliation between the commodity balances at the commodity sectoral level. Pig iron for example has been calculated as part of the products of mines, as part of the products of basic metallic industries in the form of steel, as part of the production of the metallic products sector in the form of steel sheets and fourthly as part of the transport sector.

Now the question is : Why has not the theoretical investment criteria been tried out in Egypt? There are several reasons which have to be considered, other than those so far discussed in Section One of Chapter Thirteen.

First, the assumptions underlying the current development plan differ from those underlying the investment criteria already discussed. Within the framework of the centrally plan-targets of production, the Egyptian Plan seeks to reach the predetermined goal at the minimum resource cost. Assuming that the amount of capital to be invested is given, the investment criteria discussion focusses attention on how to achieve the maximums possible immediate social return (or its rate of growth) (1)

Secondly, it can be observed from the earlier chapters that the Egyptian Economy is in no way a simple one. By 1959 the structure showed marked signs of departure from patterns considered most typical

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- (1) In a linear programming model two solutions can be worked out. In one formulation, resources (including foreign investment) are given and the net national product (or the objective function) is to be maximised. In another case, targets for the expansion of national income and limitations on its composition are specified; the minimum amount of foreign borrowing consistent with these objectives is then taken as the test of efficiency.

of low-income countries. In that year income from manufacturing accounted nineteen percent of gross domestic product. In such conditions; the application of sophisticated techniques of structural analysis, may be more suitable to cope with the purposeful change of the volume and structure of the domestic production, than the investment criteria which have been conducted almost exclusively in terms of partial analysis. (1)

There is a third reason why the investment criteria have not been tried out in Egypt. As mentioned earlier, the Plan includes a large number of projects for which commitments were made earlier but which were not yet completed at the time when the Plan was actually prepared. These projects form the non-decisional part of the Plan or the already committed-to projects that have to be implemented irrespective of any other considerations. They include : (a) projects for which physical work has actually been started, (b) projects for which an international agreement has been signed whether with or without final commitments or technical details and finally (c) other projects which the government has planned or ratified for the near future for political, military or humanitarian reasons.

Finally there are the following special problems facing the present development planning authorities in putting project evaluation on as objective a basis as possible. These are:-

(i) lack of statistical data required for investment project analysis in terms of the kind of criteria discussed earlier in this study;

(1) Compare Chenery (41) and (44)

- (ii) lack of human communication and co-ordination among the various decision-making units, especially at the project level;
- (iii) lack of qualified personnel - at the ministerial level - particularly in the field of investment project design and evaluation;
- (iv) multiplicity of development objectives; (I)
- (v) the difficulty of evaluation of both targets of economic policy and production factors; and finally
- (vi) other political considerations.

Although it may be difficult, in practice, to solve the above mentioned problems satisfactorily, any attempt in this direction will help in applying investment criteria to actual cases. As the paucity of statistical data is one of the most serious limitations it will be useful to treat this in some detail in the final section. Before coming to this, one has to decide which investment criterion suits best. the Egyptian case, that is to answer question (b) mentioned at the outset of this chapter.

As mentioned elsewhere in this study the choice of an investment criterion depends on what is that to be achieved over the given period of the plan. This is because the main purpose of an investment criterion "is to provide a tool which helps the agency select that group of projects which maximises whatever the agency wants to maximise, subject to the constraint that capital expenditure over the next years shall not exceed/

(I) The choice of technology, for instance, has posed to the planners the conflict between maximum output and savings on the one hand and providing maximum employment on the other.

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- (v) the difficulty of evaluation of both targets of economic policy and production factors; and finally
- (vi) other political considerations.

Although it may be difficult, in practice, to solve the above mentioned problems satisfactorily, any attempt in this direction will help in applying investment criteria to actual cases. As the paucity of statistical data is one of the most serious limitations it will be useful to treat this in some detail in the final section. Before coming to this, one has to decide which investment criterion suits best. the Egyptian case, that is to answer question (b) mentioned at the outset of this chapter.

As mentioned elsewhere in this study the choice of an investment criterion depends on what is that to be achieved over the given period of the plan. This is because the main purpose of an investment criterion "is to provide a tool which helps the agency select that group of projects which maximises whatever the agency wants to maximise, subject to the constraint that capital expenditure over the next years shall not exceed/

(I) The choice of technology, for instance, has posed to the planners the conflict between maximum output and savings on the one hand and providing maximum employment on the other.

exceed £X" (1)

Since Egypt is aiming at the maximum increase in net immediate national product in ten years without setbacks and deceptions; a special criterion must be used to find out the best selection of individual projects from an economic point of view. Given a stock pile of projects for which no commitment has been made, the social average productivity method of allocation as interpreted by H. Chenery will suit the purpose of selecting the best investment project set out of the available alternatives. This criterion can also be applied to the choice of techniques for producing a given commodity. According to this method no project should be included in the Plan before its overall effects have been clarified.

It should be mentioned in this connection that the SMP test is logically equivalent to the social profitability criterion(2) used in linear programming (usually called the "simplex" criterion.) provided that accounting prices are to be used.

The SMP test may be expressed as follows:

$$\begin{aligned} \text{SMP}_j &= \bar{\pi}_j + \sum a_{ij} \Delta P_i \quad \text{where} \\ \text{SMP}_j &= \text{social profit on activity } j \\ \bar{\pi}_j &= \text{is the private profit per unit} \end{aligned}$$

(1) See R. Turvey, "Present Value Versus Internal Rate of Return - an essay in the theory of the third best", Economic Journal, Vol. LXXIII No. 289 March, 1963, P.95. The author of this article is of the opinion that the right investment criterion to use is a function of what it is that is to be maximised and the relevant constraints. According to this point of view it becomes quite obvious that arguments about the rights and wrongs of alternative approaches to project evaluation and investment priorities should be about minimands (or maximands) and boundary conditions not about the investment criteria themselves. The present writer, however, is in full agreement with this opinion.

(2) See Chenery, op.cit. Reference (41) P. 38.

We turn finally to consider the problem of statistical implementation. It goes without saying that the statistical information required for the statistical implementation of the SMP criterion is with the type of data which has to be collected whichever method is implemented. But, on the whole, there is no doubt that the data which has to be collected is of the type which is required for the construction and operation of a project. The data which has to be collected is of the type which is required for the construction and operation of a project. The data which has to be collected is of the type which is required for the construction and operation of a project.

a_{ij} = of output to be calculated at market prices of commodity i is the input or output of commodity or factor i by activity j

ΔP_i = shadow prices (or weights attached to each input or output coefficient).

To put into effect the SMP criterion (1) or any other criterion, statistical information about each project as well as for the whole economy is needed, although in actual practice it is extremely difficult to trace the indirect effects that will be produced all over the economy from the investment without the use of an input-output table; the following information may be helpful to those who are interested in applying economic criteria to actual cases.

As mentioned earlier, experts working on the problem of project evaluation report that there is a deplorable situation in the present stage of statistical information. This situation is deplorable for them to make a rational decision on the acceptance or rejection of any given project. Available data, for example, did not include estimates of capacity, productive capacity and estimates of comparative

(1) These items can be carried out by various means such as

- (1) The main items of data required for the statistical assessment of the SMP criterion as worked out by Chenery and applied in Turkey is illustrated in appendix "B". A numerical example is also given. The social profitability criterion is also applied in Pakistan which has had the unique experience in the use of accounting prices to calculate the social profitability of public investment projects.

sts involved in the use of alternative technological processes. Furthermore, the deficiency of project data was paralleled by the insufficient information on the economic system as a whole. With data so scarce and inadequate, the actual allocation of resources in Egypt, as mentioned earlier, was far from ideal.

It is therefore necessary to improve the present state of statistical knowledge through further improvement of available data and also through the collection of relevant data needed for investment project selection and appraisal.

To put into effect any of the investment criteria discussed earlier, input data is needed. That is to say in order to appraise a given project the first thing to be done is to work out the input time curve for all kinds of inputs (such as raw materials, labour, professional manpower, power, fuel etc.) which the project will in all probability require. This is the first step required to work out the output time curve or the output to be expected from the inputs used.

As for the main items of inputs, they are deliveries from domestic production sectors, wages and distributed ownership income, non-competitive imports etc. This data in addition to other data including for example the age structure of fixed assets (1) should be collected for all time periods of the project (e.g. gestation period, utilization period and fruition period).

1) The Annual Industrial Survey for 1960 in India provides an example for collecting data on the age of individual equipment. In India also ad hoc surveys on the gestation period of capital investment were undertaken on an establishment basis. Prof. R. Frisch has also estimated the life expectancy of capital goods in Egypt. Table (14 - 1) shows the results.

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Table (14 - 1)

U.A.R. Egypt - Life Expectancy of Capital
Goods In Recent and Old Projects (In Years)

	Recent Projects	Old Projects
Agriculture horizontal expansion	150	150
Agriculture vertical expansion	30	25
Food industry	14	70
Leather industry	14	70
Petroleum industry (refinery)	28	60
Mining and Quarrying (including prospecting for oil)	15	70
Basic chemical industry	16	40
Building material industry	18	70
Basic metallurgical industry	24	30
Pharma	16	40
Engineering industries	16	50
Textile industries	23	60
Electricity production	25	80
Construction of residential houses	8	20
Other construction activity	6	20
Railways (tracks, stations and rolling stock)	25	80
Intertown roads (including intertown buses and trucks)	27	40
Intertown transportation (including trams and buses)	10	60
Water transportation (including barges)	22	60
Pipe-lines (including pumping stations)	50	30
Marine transportation (domestic and imported)	35	60
Air transport (domestic and imported)	4	30
Communications (telegraph, telephone and post)	23	50
Storage facilities	27	40
Suez Canal	54	60
Housing (ownership of building intended for habitation)	40	100
Public Works : water supply	50	80
Public works : sewages	50	80
Trade and financial services	20	30
Personal services	25	40
Special training (vocational and technical)	25	40
Tourism (including hotels)	20	100

Notes: Life expectancy in modern and old projects as shown in the above table was computed by Prof. R. Frisch during his visits to Cairo as a United Nation Expert. The estimates were made in collaboration with the members of the staff of the operational unit.

Source: National Planning Committee, Cairo. (Unpublished material).

The difficulty in getting this basic data for project analysis stems from the very nature of the data needed. It is well known that census data cannot provide a basis for project appraisal because of their more aggregate classification and the limited availability of technological alternatives. In other words whereas census data relate to the past, project data apply to the future. Even if historical cost data could be derived from periodical census they are only of limited value for project evaluation. The reason is that they are usually distorted by market imperfections stemming from historical, institutional, political and social reasons. As mentioned elsewhere in this study, labour costs may be higher because of institutional influences such as minimum wage legislation and activities of trade unions and the ministry of labour. Social laws in Egypt for instance, prevent the dismissal of workers who are not at the present needed because of technological improvement. Capital costs, when derived from historical data, are distorted because a large part of the existing equipment is already depreciated. Interest rates may also be affected by monetary policies and credit concessions and control. The same would apply to both training cost and administrative costs.

In such circumstances of a distorted market structure, an appraisal of projects based on market prices, when derived from historical data, will result in a misallocation of scarce resources. This is to say that if existing cost data is to be used without further adjustment there will be a heavy strain on the resources which are under - priced, while part of the over-priced resources will be left idle. The outcome is

that the aggregate yield of the project will fall short of the maximum that could have been obtained from the available resources. It is for this very reason, among others, that the writer asserts that there is a great need to adjust cost data in order to restrain the use of the under-priced factors and also to stimulate the use of those which are over-priced.

Now, the question is from where can one get the data required for investment project selection and appraisal? Promising sources of information are likely to be from those statistical units * which by nature of their operations have collected comparable data on a variety of technological alternatives and shadow prices. Engineering sources such as the technical unit and the kind-of-activity unit, are also sources from which data could be derived.

Comparable data can also be derived from other countries in the similar stage of development. This information, however, can be used in industrial planning only after a critical examination of their reliability. Table (14 - 2) shows the main items of cost data

-
- * Four statistical units should be distinguished in this connection.
- (a) The technical unit which is the smallest and most useful unit for providing data for project analysis. It can be defined as "a physically connected set or processes producing a single kind of commodity group, with allowance for joint products."
 - (b) The establishment which is the most common statistical unit includes more than one technical unit.
 - (c) The enterprise which is a legal entity and may consist of one or more establishments.
 - (d) Project data can also be gathered for and from the "kind of activity" unit. Physical input-output data are collected according to commodity groups or activities.

For further details see : United Nations Statistical Paper. Series M, No. 17 Rev. 1 (Sales No : 60 XVIII.8) "International Recommendations in Basic Industrial Statistics".

See also, Development Programming Techniques, Series No. 2 (Reference No. in my bibliography).

Table (14 - 2)

Items of Cost Data Covered by Questionnaires
Used in Industrial Inquiries in Some
Selected Countries.

Item of Cost		India	Pakistan	Philip pines.	U.A.R. Egypt.
A.	Capacity output, in physical terms.....	X	X		
B.	Gross output, in physical and value terms.....	X	X	X	X
C.	Prime cost				
cla	Materials used and material costs (in value terms, but for important raw materials in value and physical terms)	X	X	X	X
clb	Fuel and power, in physical and value terms	X	X	X	X
c2a	The number of operatives employed	X	X	X	X
c2b	Man - hours	X	X		X
c2c	Wage bill	X	X	X	X
D.	Overhead costs				
dla	The number of salaried staff	X	X	X	X
dlb	Salaries paid	X	X	X	X
d2	Depreciation	X			
d3	Fixed charges, selling and other overhead expenses.....	X			
E.	Fixed capital assets, in value terms				
c1	Machinery and other equipment	X	X	X	
c2	Land, building, etc.	X	X	X	
F.	Gross annual fixed capital investment (in value terms)				
f1	Machinery	X	X	X	
f2	Land, building, etc.	X	X	X	
G.	Stocks				
g1	Stocks of raw material				
g2	Work in progress	X	X	X	
g3	Stocks of finished products	X	X	X	

Source: Adapted from United Nations, Programming Technique Series No. 2 (Bangkok, 1961) p. 89. The column of Egypt is added by the writer.

X means data available.

required for investment project analysis and what at the present is available in some selected countries.

Knowledge of the products and their markets can also be obtained from foreign trade statistics, importers, dealers and primary users. In order to form sound economic judgement about commodities whose production is to be expanded in order to satisfy the domestic or potential demand, an analysis of import - export statistics is needed. This, however, will help the decision maker to see where domestic production could advantageously replace imports. This in turn requires a thorough investigation into the basic economic and technological characteristics of the products which have to be taken into consideration on preliminary decisions on import substitution.

To sum up, it will be useful to emphasise once again the great need to have a large amount of information on investment requirements and technological alternatives in order to evaluate investment projects effectively. It is only through increased efforts in data collection by national and international organisations, that the application of investment criteria and programming techniques can be more widely disseminated. Furthermore, through the application of economic criteria and the implementation of policies based on them; the weaknesses in the available statistics can be eliminated.

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APPENDIX "A"

QUESTIONNAIRE FOR DETERMINING
INVESTMENT PRIORITY RATINGS BASED ON THE
EXPERIENCE OF THE PHILIPPINES

This is a modified version of the Philippine investment priority system discussed in chapter 15 of E.A. 5543. For further details, see the Five Year Economic and Social Development Program, National Economic Council, Philippines.

APPENDIX "A"

Questionnaire For Determining
Investment Priority Ratings Based
On the Experience of the Philippines.

A. Diagramatic Representation
of The Economic Priority Formula*

The sum of

National Income Ratio	Balance of Payments Ratio	Domestic Material utilization Ratio	Domestic Labour Employment Ratio
Y/K	B/K	D/K	L/K
Multiplied by			
1000			

* This is a modified version of the Philippines investment priority system discussed in chapter IX of this study. For further details, see The Five Year Economic and Social Development Programme, National Economic Council, Philippines.

Determination of:-

$$(1) \text{ National Income Ratio } Y/K = \frac{E(W + r + i + Z)}{F + C}$$

Essentiality Factor E

- Depending upon: (1) Economic importance of domestic or export product
 (2) Source of raw materials and supplies
 (3) Source of capital equipment
 (4) Source of Financing

(Rated within a range of 0.5 to 2.5 points according to Check Sheet A outlined in chapter IX)

: multiplied by the sum of :

(W)	(r)	(i)	(Z)
<u>Compensation of all officials, employees and labourers, including salaries wages, bonuses commissions, allowances and others</u>	<u>Rent for the use of land, buildings and other facilities not belonging to the firm</u>	<u>Interest payments on borrowed capital</u>	<u>Anticipated returns on paid-up capital</u>
<u>Minus</u>	<u>Minus</u>	<u>Minus</u>	<u>Minus</u>
a percentage of the compensation of officials and employees who are not nationals, or who remit salary savings abroad in foreign exchange	Equipment and process rentals and similar payments remitted abroad	Interest payments on foreign borrowings	Dividends and returns remitted abroad by the firm and its stockholders

divided by $K = F + C$

Total investment in the firm which is equal to fixed assets (owned or rented) plus circulating capital.

$$(2) \text{ Balance of Payments Ratio } B/K = \frac{S - R}{F + C}$$

S = Foreign exchange that will be received by the country for products to be exported, or foreign exchange value of import - substitute products to be sold for domestic use or consumption, expressed in the national currency equivalents. Worth noting that an import - substitute product is:-

- (1) any product of any kind that was imported at some time in the past, or
- (2) any product which, although never imported, will serve a useful purpose;
- (3) any product to be considered as essential for economic development.

R = Foreign exchange costs incurred in production (to be expressed in national currency equivalents), including (by way of example)

- (1) Value of imported materials and supplies
- (2) Amortization of assets acquired with foreign exchange
- (3) Salaries of alien personnel
- (4) Technical and consulting services and royalties
- (5) Business trips abroad, etc.

K as defined in (1)

$$(3) \text{ Employment Ratio } L/K = \frac{L \cdot \bar{w}}{K}$$

L = Number of nationals employed regularly by the firm including all the labour force engaged (officials, employees and labourers).

\bar{w} = Accounting wage-rate per annum (measured by the average working days per year).

(4) Domestic Material Utilization Ratio $D/K = \frac{md}{Mt}$

md = value of domestic materials and operating supplies
used in production by the project;

Mt = value of total raw materials and operating supplies
used in production by the firm;

The coefficient $\frac{md}{Mt}$ represents a measure of the additional
economic value to be generated by the
utilization of domestic materials.

B. Mathematical Expression of The Economic Priority

Formula:-

$$\begin{aligned}\pi_g^n &= \frac{E(W + r + i + Z)}{K} + \frac{s - R}{K} + \frac{L \cdot \bar{w}}{K} + \frac{md}{Mt} \times 1000 \\ &= Y + B + L + D \times 1000\end{aligned}$$

where:

π_g^n is the industrial priority additive ratio;

n is the serial number of the project;

g indicates investment direction;

Y = national income effect per unit of capital resources
utilized;

B = balance of payments effect per unit of capital resources
utilized;

L = employment effect per unit of capital resources utilized;

D = the social value derived from domestic materials
utilization per unit of capital resources utilized.

C. Other Qualitative Considerations

It should be mentioned that the determination of industrial priorities in the light of the Philippines experience would be based not entirely on the quantitative method outlined here, but also on other qualitative considerations such as the following:-

1. Overcrowding of an industry;
2. Established government policy for specific projects;
3. Effect of abnormal factors such as the pricing of labour, materials and products;
4. Possible effect on increased domestic production of raw materials.

Although the abovementioned considerations do not easily lend themselves to quantification they are pertinent to industrial priority determination. Accordingly a proposed investment project should not be considered if the industry to which it belongs is relatively overcrowded or if the aggregate productive capacity in the industry was in excess of the demand for the product save for the case where the new project would improve the competitive conditions in the country for the benefit of the public.

D. Price Criteria

It was understood that the purpose of the Philippines investment priority system was to measure the social profitability of the proposed investment projects. The contribution to national income was taken as a measure of the benefits arising from the project. In a first approximation the national income profitability is assessed on the basis of market prices, then price corrections were applied to costs and benefits whenever the available data permitted in order to compensate for discrepancies between market and social values. In the

case of the Philippines two methods of corrections are used. The first method corrects the market prices of foreign exchange. This correction was intended to reflect the scarcity of foreign exchange. Corrections for the use of domestic raw materials and for increasing employment was also made. The former correction was included to stimulate domestic production of such materials; the latter, to provide for a preferential treatment of employment creating projects.

A second method of correction has been also applied in the Philippines. This method consists of attributing additional benefits to a project which has a beneficial impact upon the rest of the economy, either forward or backward. The rationale underlying these corrections is that, in so far as a project produces commodities which are used as inputs elsewhere in the economy, or uses commodities which are produced by other sectors, it stimulates economic activity and consequently gives rise to additional benefits that should be attributed to the project considered.

The abovementioned corrections however are tantamount to using, instead of market prices, "shadow" or "accounting" prices, which measure the social value of factors and products.

APPENDIX "B"

QUESTIONNAIRE FOR THE CALCULATION
OF THE SOCIAL RETURN
ON INVESTMENT BASED
ON THE EXPERIENCE OF TURKEY

2. Foreign exchange earnings (in million TL)
3. Net foreign exchange income (in million TL)

APPENDIX "B"

Questionnaire For the Calculation
of the Social Return on Investment
Based on the Experience of Turkey

A. INVESTMENT:-

1. Value of fixed assets
 - a. Site
 - b. Buildings and construction
 - c. Machinery and equipment
 - d. Installation costs
2. Working capital
3. Total investment
 - a. Domestic cost
 - b. Foreign exchange cost

B. SALES:-

1. Value of sales, by product
2.
 - a. Exports
 - b. Substitutes for goods at present imported
 - c. Other domestic goods

C. COSTS:-

(All costs are included except for purchase of office supplied and other miscellaneous overhead items which amount to less than one per cent of total costs. Imported components of each item are tabulated separately)

1. Raw materials
2. Energy
3. Auxiliary materials
4. Maintenance
5. Labour
 - a. Administrative
 - b. Technical
 - c. Skilled
 - d. Unskilled (less than six months' training required).

D. FOREIGN EXCHANGE EFFECTS:-

1. Foreign exchange costs
 - a. Annual cost of the foreign exchange component of investment.
 - b. Cost of imported materials (from C)
 - c. Indirect import component of domestic materials.
2. Foreign exchange earnings (from B. 1a)
3. Net foreign exchange effect (D. 2 minus D. 1)

E. SOCIAL PRODUCTIVITY:-

1. Gross private profit (sales minus costs, exclusive of taxes and interest)
2. Corrections for social value:-
 - a. Price corrections for protection, subsidies, etc.
 - b. Foreign exchange value
3. Increase in social value (E. 1 plus E. 2)
4. Rate of private return on investment (E. 1 divided by A. 3)
5. Rate of social return on investment (E. 3 divided by A. 3)

F. MATHEMATICAL EXPRESSION OF THE ECONOMIC PRIORITY FORMULA:-

From a theoretical point of view the comparison of value of output to cost of input can be stated in any one of the following forms:-

- (a) Social return on total resources used throughout the economy = $\frac{\text{Total value of output}}{\text{Cost of total labour, capital and natural resources.}}$
- (b) Social return to resources used in a given sector = $\frac{\text{Value of output minus cost of purchased materials and depreciation}}{\text{Cost of direct labour and capital}}$
- (c) Social return to capital used in a specific sector = $\frac{\text{Value of output minus cost of materials, depreciation and labour}}{\text{Investment}}$

Note that the only difference between formula (c) and (b) is that labour cost is subtracted from the value of output in (c) to give the return to investment alone.

In practice, formula (c) is applied as it can be seen from the empirical evidence cited in table (1.1). The formula used can be mathematically expressed as follows:-

$$\pi = \frac{(xPx - LPx - MPm)}{I} + \frac{(x\Delta R - L\Delta Pe - M\Delta Pm)}{I}$$

where the notations denote the following

π Social average return on investment

X Output

L Labour

M Purchased materials plus maintenance and depreciation.

P_x, P_l and P_m = market prices for factors and products

$\Delta P_x, \Delta P_l$ and ΔP_m = Price corrections* measured by the difference between market prices and accounting prices in order to compensate for the divergence between market and social values.

I = investment

* The Turkish study however applies three corrections to the private profit of an investment in order to compute its social profitability:

- (i) a price correction to the value of output to allow for the effects of tariffs and export subsidies;
- (ii) an exchange rate correction to the prices of imported inputs and outputs representing the difference between the actual exchange rate (2.80 lira per dollar) and an estimate of the accounting price of foreign exchange (3.64 lira per dollar);
- (iii) a labour cost correction representing the difference between the opportunity cost of unskilled labour and its wage rate (only in agriculture)

G. NUMERICAL EXAMPLE:-

Table (1.1) shows the procedure for computing the private and social return on investment in each project selected.

Item 1, 2 and 3 in that table provide the data needed for the estimate of the private rate of return on investment (line 5b), which is the first part of the measurement of social return on investment. Item 4 shows a breakdown of the total foreign exchange effect into

(a) the annual cost of the foreign exchange component of the investment, (b) the annual cost of imported materials (including an allowance for the import components of steel, power, etc.), and (c) annual foreign exchange earnings or savings. Foreign exchange earnings or savings were only credited to a project in cases where the domestic price was less than the import price valued at the accounting exchange rate, since otherwise the protected domestic price already reflected the value of foreign exchange.

Lines 6a and 6b of the table give the price correction and exchange correction as percentages of total investment so that they can be added directly to the private profit. The price correction is the difference between the output value and the world price (i.e. the landed cost of imports evaluated at the accounting rate of 3.64) and the Turkish market value. This correction reduces the profit rate on the investment in cotton fabrics, for example, by 11.3 per cent. The exchange rate correction is equal to 30 per cent of the net foreign exchange effect in item 4, representing the difference between the accounting exchange rate and the actual exchange rate. In canning, for example, the effect of foreign exchange cost reduces profits by 383,000 lira or 11.6 per cent whereas in woollen textiles, the result of foreign exchange earnings is to increase profits by 8.1 per cent of the investment.

The five examples shown here illustrate the substantial changes in priority that result from considering social profit instead of private profit. The ratios of social profit to the industry average shown in item 7a are quite different from private profit ratios in line 5c. Even the partial application of accounting prices that was possible in this case probably gave a better picture of social priorities than did the private profit rate, which was affected by a number of arbitrary elements.

Table (1.1)
Calculation of the social return on investment
in Turkey (Thousands of Turkish Lira)

	Canning	Cotton fabrics	Wool text- iles	Fiber board	Wire goods	All indust- rial projects
Number of Plants	7	3	3	2	4	126
1. Total sales	4,370	39,050	14,470	3,460	4,390	251,400
(a) % import substitutes or exports (a)	0	0	50%	100%	0	10%
2. Total cost	3,270	27,490	12,180	2,250	3,390	192,500
(a) Raw materials (%)	46%	70%	67%	20%	79%	74%
(b) Labour (%)	11%	14%	18%	20%	9%	12%
(c) Energy, auxiliary materials, mainten- ance and other	43%	15%	15%	60%	12%	14%
3. Total investment	3,300	39,020	10,340	5,000	2,530	195,000
(a) Foreign exchange component	1,010	16,107	3,500	3,076	700	80,900
4. Total foreign exchange effects	-1,275	-4,843	7,818	2,561	-846	-15,400
(a) Investment cost (b)	-91	-1,450	-315	-268	-62	-7,300
(b) Annual operating cost	-1,181	-3,393	-4,098	-629	-784	-29,600
(c) Annual earnings (c)	0	0	7,231	3,458	0	16,500
5. (a) Private profit (1-2)	1,100	11,560	2,350	1,210	1,000	58,800
(b) Private returns on investment (d)	.333	.296	.277	.241	.394	.302
(c) Ratio to industry average	1.11	.98	.75	.80	1.31	1.00
6. (a) Price correction (e)	0	-.113	0	0	0	-.035
(b) Foreign exchange effect (f)	-.116	-.037	.081	.154	-.160	-.034
7. Social return on invest- ment (5b+6a+6b)	.217	.146	.308	.395	.294	.233
(a) Ratio to industry average	.93	.63	1.32	1.70	1.26	1.00

Source:- Turkish Investment and Economic Development op.cit (Reference
(35), See also reference (195)).

- (a) Only items included at import or export cost at official exchange rate
 (b) 9 per cent of (3a).
 (c) Percentage (1a) applied to (1)
 (d) $(5a) \div (3)$
 (e) As ratio to (3)
 (f) $.30 \times (4)$
 (3)

APPENDIX "C"

THE ROLE OF ACCOUNTING OR SHADOW PRICES IN PROJECT EVALUATION

related topics, as well as

APPENDIX "C"

The Role of "Accounting" or
"Shadow" Prices in Project Evaluation

As indicated elsewhere in this study, accounting prices are fictitious ones that may be assigned to cost elements or products.(1) The basic objective is to give a better approximation of the relative importance of production factors and products to the economy. Strictly speaking; shadow prices are the price levels at which there is equilibrium between supply and demand. Furthermore, accounting prices are also valuations of the targets of economic policy. In this sense accounting prices may be considered as a convenient tool for evaluating investment projects especially those coming under the domain of the public sector.

So far as inputs are concerned, the accounting price of an input such as labour, capital or foreign exchange represents the opportunity cost of that input, that is to say the loss to the economy that would result from a reduction in its supply by one unit. Accordingly a production factor such as capital which is in short supply in most developing countries should have an accounting price higher than its market price. On the other hand, unskilled labour which is surplus should have a valuation that is lower than its market price.

So far as targets of economic policy are concerned, accounting prices are to be used as rating-coefficients to be assigned to each objective in order to assess its relative importance to the economy as a whole. For instance what is more value to the nation as a whole a unit increase in

(1) For details see, for instance, the references number 149,181,188,190, 194 and 197 in my selected bibliography on investment criteria and related topics, Appendix D.

national product or a unit increase in employment or a unit increase in savings or a unit increase in some social welfare index?

Accounting prices are also partial ratings to be assigned to each individual project in order to assess the relative importance of each component of its various effects on all aspects of the government's development policy. As mentioned earlier, in order to appraise a given project, the first thing to be done is to determine its impact or effects on the economy as a whole. That is to say its impact on a variety of fields, such as anticipated yield in terms of an increase in net national product or in national consumption; provision of remunerative employment; impact of the balance of payment and possibly also the impact on regional distribution of productive capacity and on the distribution of income. As we have mentioned in the final section of chapter XIII; the most accurate method of assessing the economic impact of a given set of investment projects would be to use a detailed econometric model bringing out all the relationships between the projects whose effects are to be ascertained and the economy as a whole. Where this is not practically feasible approximative methods for project evaluation must be recommended. It is therefore necessary to use accounting prices in project evaluation. The purpose of the valuation procedure is to indicate priorities among individual projects that are to be included in a development programme or a plan.

The question now arises how accounting prices are to be determined. As to the simultaneous determination of accounting prices for factors and commodities an ideal solution can be obtained by the use of the technique of linear programming, provided all the parameters can be determined. A trial and error method has been also recommended by Prof. Tinbergen for the estimation of accounting prices.

As indicated elsewhere in this study, any production factor which is expected to be in short supply should have an accounting price higher than its market price. The reverse would apply to any production factor which is surplus. An initial estimate of the accounting price of capital can be based for instance on the interest rates paid by private investors with allowance made for differences in risk among different types of loan. As suggested by some United Nations experts, an accounting interest of 200 per cent of market rates for commercial loans may reflect the relative scarcity of capital in less developed countries. It is also suggested that an accounting wage of 50 per cent of market wage may reflect the relative abundance of labour. As for the accounting price of different types of skilled labour a tentative estimate can be based on the cost of moving workers from villages to industrial areas.

The most important accounting price is that of foreign exchange. Ideally the accounting price of foreign exchange would be equal both to the incremental cost of saving foreign exchange through import substitution and the incremental cost of earning foreign exchange through exports. In Pakistan, for example, an initial estimate of the value of foreign exchange in the First Five-Year Plan was based on an analysis of the supply and demand conditions for jute and jute products which are the largest element in Pakistan exports. It was also thought desirable to use an accounting exchange rate to allow for the distortion in the value of imports and exports. Although the rate applied was largely a matter of judgment it was based on a calculation of the rate that would be necessary to make the most promising export and import substitutes yield a competitive return on the resources used. All-in-all in Pakistan,

the accounting price of foreign exchange was used to calculate the social profitability of the main projects so far proposed for public investment by the Pakistan Industrial Development Corporation.(1)

(1) A noteworthy feature of the foreign exchange benefit calculation has been the subtraction of the potential foreign exchange lost due to non-export of the domestic raw materials from the total foreign exchange earned or saved in each case.

APPENDIX "D"

SELECTED BIBLIOGRAPHY
ON INVESTMENT CRITERIA
AND RELATED TOPICS

APPENDIX "D".

A) Dedication

For those who are seeking economic
knowledge for its own sake.

B) Abbreviations

Q.J.E.	Quarterly Journal of Economics.
E.J.	Economic Journal.
J.P.E.	Journal of Political Economy.
J.E.H.	Journal of Economic History.
S.J.P.E.	Scottish Journal of Political Economy.
I.E.J.	Indian Economic Journal.
I.E.R.	Indian Economic Review.
Eca.	Economica.
Ect.	Econometrica.
O.E.P.	Oxford Economic Papers.
Rev. of Econ. & Stat.	Review of Economics & Statistics.
R.E.S.	Review of Economic Studies.
A.E.R.	American Economic Review.
P.M.R.	Productivity Measurement Review.
E.R.	Economic Record.
Metro.	Metroeconomica.
E.I.	Economia Internazionale.
Kyk.	Kyklos, International Review for Social Sciences.
C.I.N.P.	Cairo Institute of National Planning, UAR, Egypt.

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